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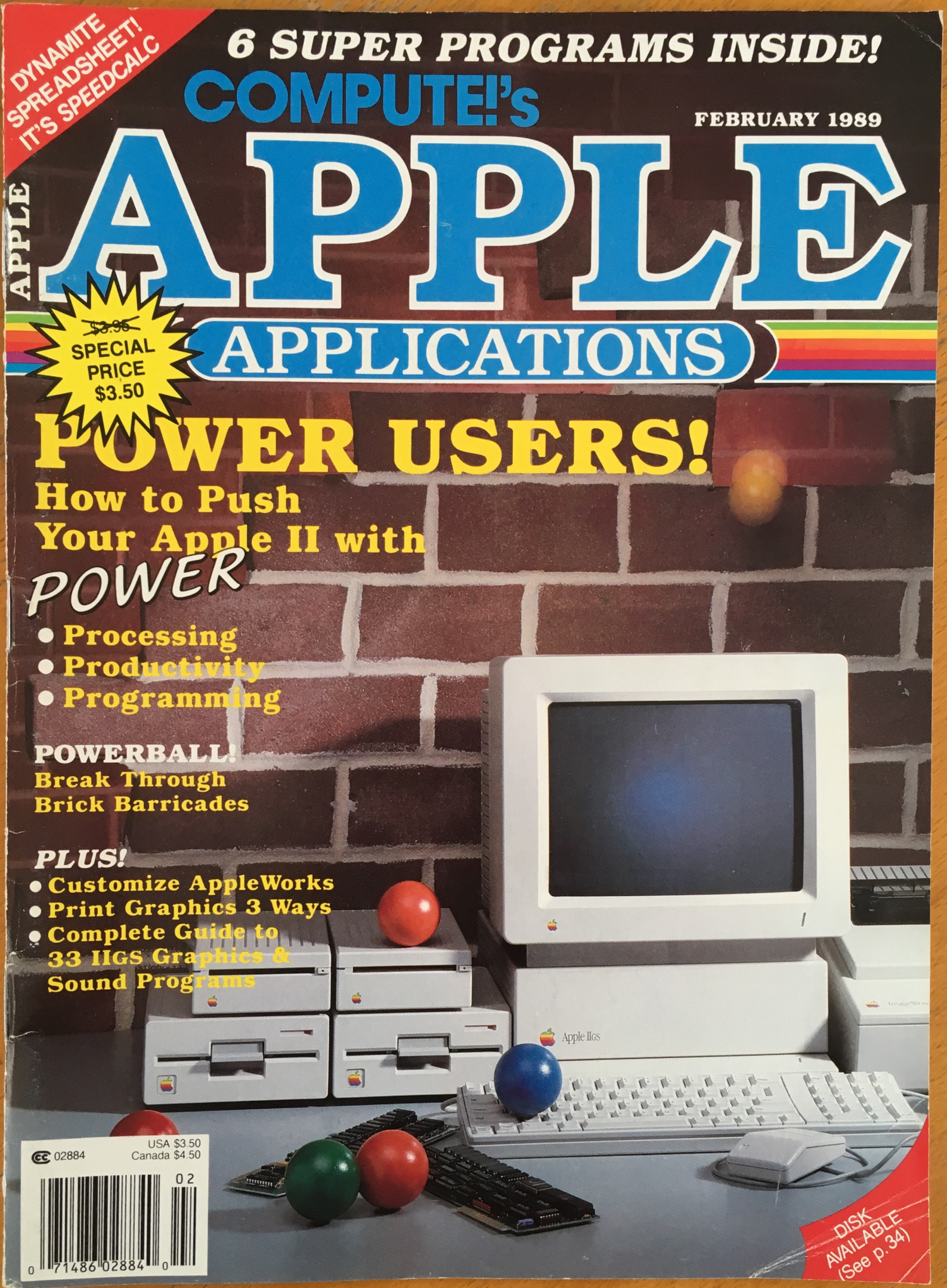

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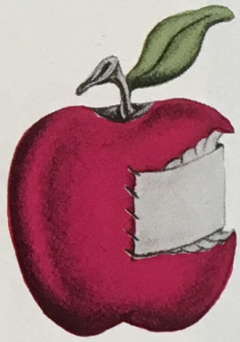
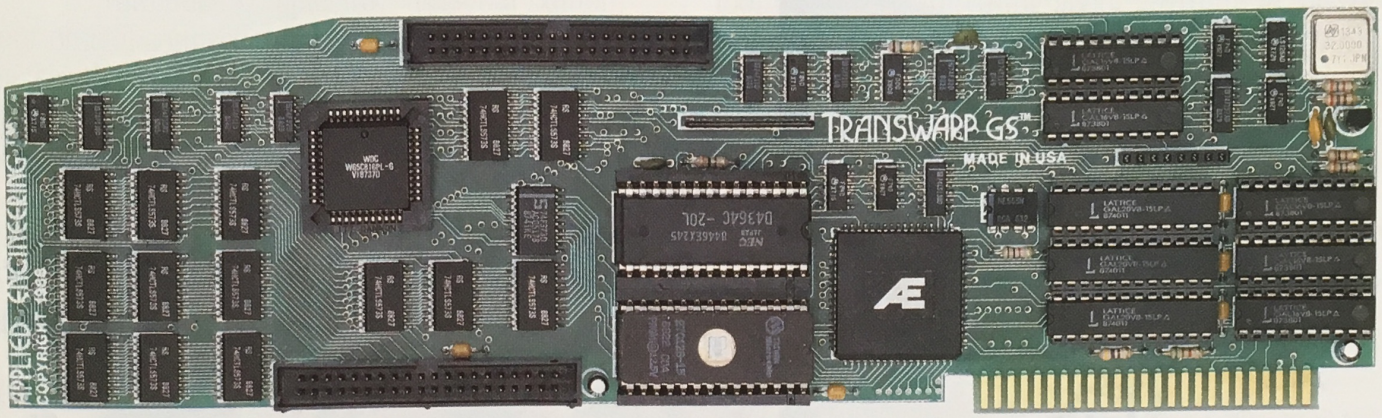


At Work

At School

Indicates
Type-In Program

February 1989—Vol. 7, No. 1, Issue 13



The Apple IIGS

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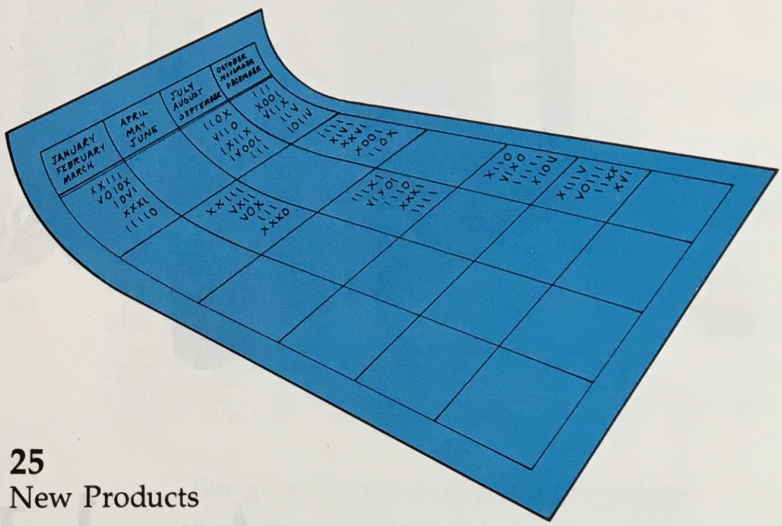

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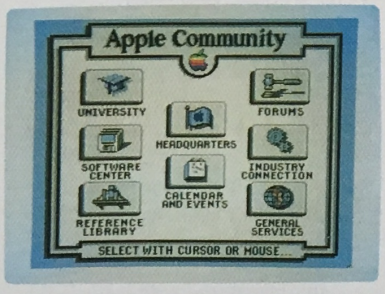

There are online forums to attend, where you can learn in the presence of computer masters. Whether you're a novice or an expert, you can get advice from the pros on the tricks and subtleties of software programs that run on Apple computers.

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Editor's Notes

Any computer can be a *power machine,* just as anybody can be a *power user.* All it takes to turn a weakling computer into a monster is a lot of impressive and sometimes expensive hardware. All it takes to turn a jittery computer user into a macro junkie is a lot of software and a lot of time.

Many of you reading this, of course, are already power users. You have floppy disk drives, hard disk drives, color monitors, high-quality printers, and other peripherals that have transformed your computer into a maw that eats, digests, and expels information at a prodigious rate. Nothing scares you, not telecommunications, not printer malfunctions, not even temporarily lost data. You can cope.

Others of you aren't quite so sanguine about the computer. Perhaps you bought your Apple II only a few months ago. Your investment, by necessity, is starting out small, both in money and time. But you want to make the transition from rank amateur to confident pro in as short a time as possible.

This issue of *COMPUTE!'s Apple Applications* offers an article that will help make you the power user you dream of being. And even if you have enough software to bend that shelf above your computer, you'll find some new definitions for the term *power* in "Becoming a Power User."

This magazine isn't strictly about products and how you can apply them, though. *COMPUTE!'s Apple Applications'* focus and strength has always been the software found between its covers. This issue includes some of the most powerful type-in programs we've ever published. *SpeedCalc* is a full-featured spreadsheet that can crunch numbers with the best of them. "Powerball," a fascinating variation of the classic *Breakout,* serves up some anxious moments as you work your way through eight screens of brick walls. Other power software awaiting your typing includes a utility that lets you print hi-res graphics in three different sizes, an *AppleWorks* customizer, and a menu generator you can use in your own programming efforts.

As always, if you don't have the time to type in the programs, you can order *COMPUTE!'s Apple Applications Disk,* which contains all the software in this issue. Check page 1 for details on ordering the disk.

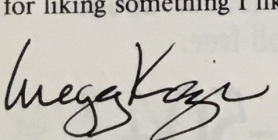
Unfortunately, though this issue of *COMPUTE!'s Apple Applications* is packed with power programs and features, it is also the last issue. *COMPUTE!'s Apple Applications* is ending as it started—as a magazine that provides the best possible type-in software for the Apple II. Such past programs as "SpeedScript-80," "Heat Seeker," "Basketball Sam & Ed," *Laser Chess,* and "ProDesk" proved that a publication could offer quality software even if that software had to fit inside the pages of a magazine.

The COMPUTE! Publications staff, which collectively publishes three other magazines, has worked hard on *COMPUTE!'s Apple Applications.* Two people in particular have given it their best—Randy Thompson (associate editor) and Janice Fary (senior art director). Randy has guided the magazine through its day-to-day operation for the past year, while Janice has given it its current clean design.

COMPUTE! Publications is not abandoning the Apple II. Within the pages of *COMPUTE!,* its flagship magazine, you'll continue to find Apple II–specific news and product reviews, as well as features, columns, and departments that are written for you, the home computer owner who wants to understand how to use your computer for entertainment, education, and productivity.

And we'll be producing a series of Apple II disks in 1989, disks that will contain the top-notch software you're used to seeing in these pages. Watch *COMPUTE!* magazine for announcments of their availability. If you're a software author, send your Apple II submissions to COMPUTE! Publications, Attention: David Hensley, Assistant Editor, Submissions and Disk Products, 324 West Wendover Avenue, Greensboro, North Carolina 27408.

Finally, thanks. Thanks for reading this magazine. Most importantly, thanks for liking something I like—the Apple II.



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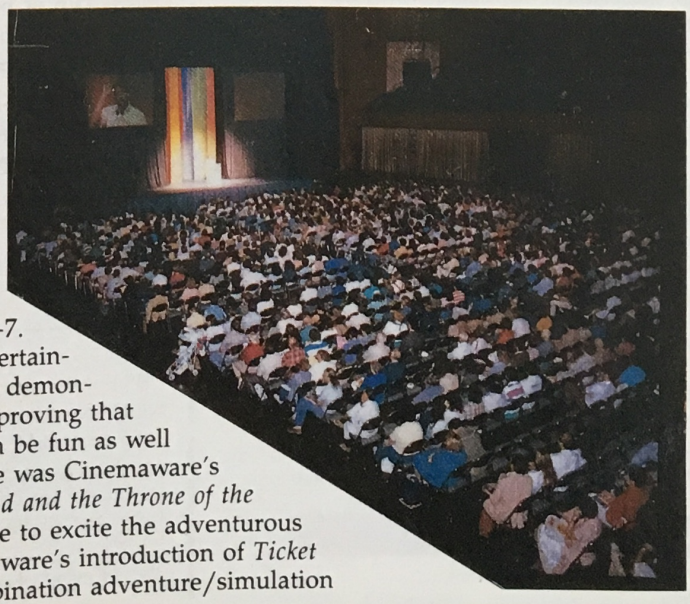
AppleFest Invades San Francisco

The San Francisco AppleFest attracted more than 28,000 people and 175 different companies.

More than 28,000 people made their way to San Francisco's Civic Auditorium and Brooks Hall for the September 1988 AppleFest, a computer show devoted entirely to Apple computers and their home, school, and home-office applications. More than 175 companies filled the 80,000-square-foot exhibit hall, making this the largest assemblage of products for the Apple II computer.

AppleFest attendees were treated to product demonstrations, conferences, speeches from industry leaders, and new product announcements for desktop publishing, entertainment, education, graphics, and music hardware and software. Featured speakers included John Sculley, president and chief executive officer of Apple Computer; Charles Boesenberg, senior vice president of Apple Computer's U.S.A. division; and Steve Wozniak, the cofounder of Apple Computer and designer of the original Apple II computer.

For most, it's the new products that make AppleFest such an exciting event. In the educational arena, Learning Lab and Pelican Software released *Dinosaur Days*, the latest title in their Creative Writing series; The Learning Company introduced *The Children's Writing and Publishing Center* for ages 9 and up; Mindscape came out with several new products, including *Poetry Express* and *Hinky Pinky*, two programs designed for the child's exploration of writing rhyme and reason; and Davidson and Associates presented speaking versions of *Reading and Me* and *Math and Me*, two early learning programs for ages 3–7.



Several new entertainment programs were demonstrated at the show, proving that Apple computers can be fun as well as educational. There was Cinemaware's presentation of *Sinbad and the Throne of the Falcon*, a product sure to excite the adventurous mind; Blue Lion Software's introduction of *Ticket to Hollywood*, a combination adventure/simulation program that takes you through 80 years of movie history and thousands of facts of movie lore; and Britannica Software's preview of its edu-tainment program, *Jigsaw! The Ultimate Electronic Puzzle*.

Apple II desktop publishing programs are starting to mature. *Springboard Publisher* (from Springboard Software) has made it to version 2.0. With its new release, *Springboard Publisher* gains speed, laser-printer support, a set of newsletter templates, and more. Berkeley Softworks displayed its newest entry in the desktop publishing realm, *geoPublish*. It has several layout features and a built-in multifont word processor. *geoPublish* requires Apple GEOS, Berkeley's Graphics Environment Operating System for the Apple II. Milliken announced its Apple IIGS–specific program, *Medley*—the only Apple II desktop publishing program that supports color graphics.

AppleFest gave Claris a chance to show off its new *AppleWorks GS*. This promising new product combines word processing, database, spreadsheet, page layout, and communications all in one integrated software package.

The next AppleFest show is to take place in Boston on May 5–7, 1989. For AppleFest tickets and information, call (800) 262-FEST; in Massachusetts, call (617) 860-7100.

— *Randy Thompson* ▷

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Back Issues

1985

Spring

Features: Considering Business Software; Business Application Software Buyer's Guide; Jazzing with the Macintosh; Is Anyone Out There?—Getting Ready for Telecommunications; The Database Explosion: A Buyer-Beware Guide; A Game-Lover's Choices: The Ten Best-Ever Apple Games; What Makes Superior Educational Software?; Educational Software Buyer's Guide; Up and Coming Apple: Past, Present, and Future of Apple Computer. **Programs:** Softsearcher; Pie Plot; Heat Seeker; Chess; Spelling Bee.

Fall

Features: Apple at Ten and What's Coming in the Next Decade; Buyer's Guide to Business Software: What's New; Desktop Publishing: The Proliferating Press; Cruising the New MAUG: A Guide to Downloading Programs; How to Use Bulletin Boards—or Start Your Own; The State of Educational Computing; Educational Software Buyer's Guide: What's New; The Electronic Classroom: What to Look For in Education; The Big Picture; Machine Language on the Macintosh: A 68000 Overview; The Office for Everyone: Using the Macintosh in Business; Machine Language Fundamentals. **Programs:** Worm of Bemer; Reflection; Apple Animator; Enhanced Applesoft INPUT; Dr. Disk; The ApWriter.

1986

Spring

Features: '86 Apple: An Interview with John Sculley; Buyer's Guide to Business Software; The Expanding Macintosh; It's New II; Off the Beaten Software Path; MacAdds: More for the Macintosh; Apple User Groups; Apple Rules the Schools; Computers in the Humanities: Liberal Arts Enter the Computer Age; Buyer's Guide to Educational Software; Personal Publishing with Your Macintosh. **Programs:** Lexitron; Backgammon; Windows; MouseCursor; Your Personal Ledger; Keynote.

Fall

Features: The New Apple IIGS Computer: A Hands-On Look; The Brains Behind the Brains: An Interview with William Mensch, Microprocessor Pioneer; New on the Wire; Mastering Microsoft *Works;* Buyer's Guide to Business Software; Inventing the Future: New Directions for Computers in Education; Educational Software Buyer's Guide; Your Graphics Primer; Apple User Groups. **Programs:** The Story Machine; Hi-Res Poster Printer; Solarpix; Math Worksheet; Hi-Res Character Generator; Easy Apple Screen Editing; DOS Adjust; High Rise; Power Sketch.

1987

Spring

Features: Apple to the Macs; *AppleWorks* Forever; Buyer's Guide to Business Software; Apple in the Office; The IIGS: A Rainbow Brush, a Fresh Canvas; Apple IIGS Software Buyer's Guide; Arts and Crafts Go Digital; 18 Intriguing Computer Bulletin Boards; Getting to Know the Apple SIGs; What Every Parent Needs to Know About Computers; From School to Shining School: Interviews with Apple's Educational Marketing Managers; Educational Software Buyer's Guide. **Programs:** Biker Dave; MemCopy; Picture Maker; *Apple SpeedScript; Newsroom* to *Print Shop* Graphics Converter; Hickory, Dickory, Dock; Memory Mate.

December (first bimonthly issue)

Features: Going to Work; Macintosh: The Word Explosion; Making IIGS Music; Which Apple for You?; The Substitute Teacher; IBM vs. Apple: The Struggle for the Educational Market. **Programs:** Vulcan Mines; ProDesk; WindowMaker; ProDOS File Stamper; The Clipper; Number Construction Set; Calendar Maker.

1988

February

Features: AppleFest: Celebrating the II; Mastering *MacDraw;* An IBM Inside the Apple: Applied Engineering's PC Transporter; The Electronic Sandbox: Multimedia in Education; The Upgrade Path; Print It; Mountains of Memory. **Programs:** Instant Calculator; NewsWriter; Triad; *Laser Chess;* PS Draw; Disk Alarm; Rat Race.

April

Features: New Vistas: Hot Games for the Apple IIGS; Buyer's Guide to Apple IIGS Games; How Real Can You Get: Simulations Are Better than Ever; Buyer's Guide to Math Games; Power of the Press; *HyperCard:* Programming Without Pain; The Taxman Cometh. **Programs:** Locker; Help Letters Survive; Stars: An Astronomical Simulation; Basketball Sam & Ed; Mosquito Madness; DOS 3.3 Dates.

August

Features: Apple GEOS: The Eight-Bit Macintosh; Buyer's Guide to Adventure Games; The Preschool Apple. **Programs:** Sounding Board; Galaxy Defender; The Photo Exchange; Gradebook; NoZap.

October

Features: Online Education; And the Winners Are . . .; Buyer's Guide to Apple Graphics; The Finder Found Out. **Programs:** Air Rescue; Window Pack; Cribbage; Poster Maker; Fractal Sketcher; Scrambler.

December

Features: How to Get Published; Christmas Wish List; Buyer's Guide to Sports Games; Getting It on Paper. **Programs:** Hi-Res Picture Packer; Six Pack; Hi-Res F/X; Bounty Hunter; Slide Show; Toolbox BASIC.

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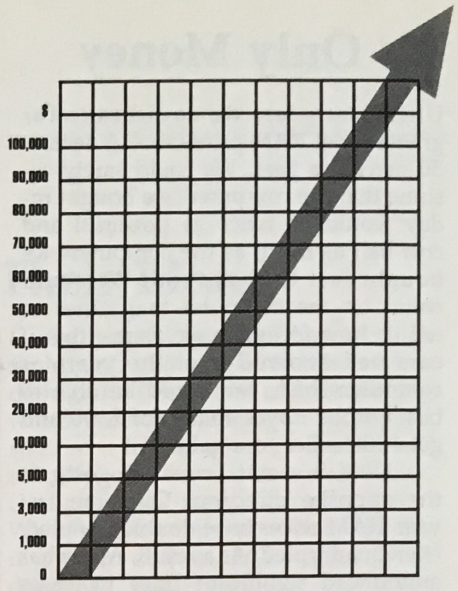
Apple IIc Plus Mini-Software Guide

The following table lists just a few of the software titles that are available on 3½-inch disks. Under the Package heading, the term *Double-pack* means that both 5¼- and 3½-inch disks are provided in the same package. *Separate SKU* signifies that a 3½-inch disk is available in a separate package that may have to be specially ordered.

Program	Developer	Package
Desktop Publishing		
Certificates and More	Mindscape	Separate SKU
geoPublish	Berkeley Softworks	Double-pack
Publish It! 2.0	Timeworks	Double-pack
Springboard Publisher	Springboard Software	Separate SKU
Educational		
Designasaurus	Britannica Software	Double-pack
Electric Crayon series	Polarware Software	Separate SKU
Math and Me	Davidson and Associates	Separate SKU
Muppetville	Sunburst Communications	Separate SKU
Reader Rabbit	The Learning Company	Separate SKU
Reading and Me	Davidson and Associates	Separate SKU
Read 'n Roll	Davidson and Associates	Separate SKU
Ticket to . . . series	Blue Lion Software	Separate SKU
Where in Europe Is Carmen Sandiego?	Brøderbund Software	Separate SKU
Word Attack	Davidson and Associates	Separate SKU
Writer Rabbit	The Learning Company	Separate SKU
Entertainment		
Balance of Power	Mindscape	Separate SKU
Bard's Tale III	Electronic Arts	Double-pack
California Games	Epyx	Separate SKU
Flight Simulator	SubLOGIC	Separate SKU
King's Quest	Sierra On-Line	Double-pack
Pirates!	MicroProse	Separate SKU
Rampage	Activision	Double-pack
Tetris	Spectrum-HoloByte	Double-pack
Graphics		
Award Maker Plus	Baudville	Separate SKU
Dazzle Draw	Brøderbund Software	Separate SKU
Design Your Own Home	Abracadata	Double-pack
Print Magic	Epyx	Separate SKU
Print Shop	Brøderbund Software	Separate SKU
Slide Show	Scholastic Software	Separate SKU
VCR Companion	Brøderbund Software	Separate SKU
Productivity		
AppleWorks 2.0	Claris	Double-pack
Bank Street Writer Plus	Brøderbund Software	Separate SKU
DB Master	Stone Edge Technologies	Double-pack
GEOS	Berkeley Softworks	Double-pack
MouseWrite	Roger Wagner Publishing	Double-pack
TimeOut series	Beagle Bros.	Double-pack
Wordbench	Pinpoint Publishing	Double-pack
WordPerfect	WordPerfect	Double-pack



Another Record-Breaking Quarter

If there's one thing that Apple does well, it's make money. In the second quarter of 1988, Apple Computer doubled its earnings as compared to the same quarter of the previous year—net income was up by more than $46 million. More recently, Apple Computer announced a 1988 fourth-quarter net income of $107.9 million, a 51-percent increase over the $71.7 million of the year before. And with an unprecedented 53-percent increase in sales, Apple Computer broke all of its previous records with a whopping $4.07 *billion* worth of sales for the entire year of 1988.

"These results mark our tenth consecutive quarter of growth in sales and earnings. This performance underscores the continued success of Apple Computer and is due, in large part, to our success with the Macintosh product family in business markets around the world," says John Sculley, chairman and chief executive officer of Apple Computer.

"Just as important, Apple continues to experience steady growth in our educational market. The Apple IIGS continues to be the leading unit seller within the Apple II product family, and its sales increased during the fourth quarter.

"During the past two years, Apple's annual sales and earnings have more than doubled. Our new products have enabled us to enter new markets and attract new customers. And we have created an organization that can meet the challenges of rapid growth. As we enter fiscal year 1989, we look forward to another year of significant growth for Apple."

— *Randy Thompson* ▷

It's Only Money

$ $ $ $ $ $ $ $

Until last year, we could take for granted that RAM prices would decline 30 percent a year. We could safely assume that the computers we bought today would be twice as powerful and cost half as much as the computers we bought last time around. We could count on the computer magazines to tell us how fortunate we were—that if cars had evolved over the years as computers had, we would be able to buy a Rolls Royce today for $300 and get 1000 miles to a gallon.

Now, it seems prices are going in the opposite direction. Over the last year, RAM prices have doubled, tripled, even quadrupled. As a result, Apple has announced significant price increases for most of its computers, external drives, monitors, laser printers, and expansion kits. While the price of the Apple IIe will stay the same, the suggested retail price of the Apple IIGS has changed from $999 to $1,149. Apple's monochrome, color composite, and RGB monitors have jumped from $129, $379, and $499 to $159, $399, and $599, respectively. And the 5¼-inch and 3½-inch drives have increased from $299 and $399 to $329 and $429.

As you might have guessed, Apple saved its biggest increases for its memory expansion kits. The Apple II 256K memory expansion kit and the Apple IIGS memory expansion card have jumped from $69 and $129 to $159 and $229—an increase of 130 percent and 78 percent. (The biggest increase, in terms of dollars, is the 4MB Macintosh II with a 40MB hard disk, which increased by a healthy $800, or about the cost of a brand-new Apple IIe. This particular Mac II now sells for $8,069.)

Apple blames the price increases on "rising component costs and changing global market conditions." Read this as skyrocketing RAM prices and an American dollar that has fallen sharply against the Japanese yen. Some industry analysts have pointed out that RAM prices have already peaked and that prices have begun to drop. Apple counters that its long-term contracts, which were signed before the current RAM shortage, have only recently expired, and it's now forced to buy memory chips at today's higher prices. This is cold comfort to Apple dealers, who are upset with Apple's announcing the price increases just as the dealers were ordering for the Christmas season.

Let's assume for a moment that Apple doesn't lose its market share by pricing itself out of the market. What will it do with its increased profits? Many Apple owners might hope for better service and support. Others, with an eye to the future, might hope for additional research and development. Just think—the extra money we pay to Apple today might show up in the Apple IIXYZ mini-supercomputer in 1999. Then again, maybe we'd rather put our money in the bank and let it grow with compound interest. Then we could afford to buy the Apple IIXYZ in 1999.

— David English

More Power, Scotty!

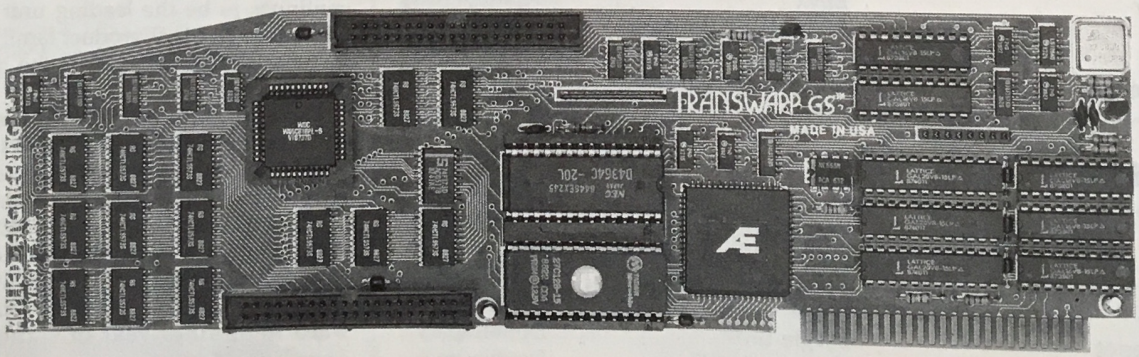
No, it's not a machine that transforms your atoms and sends them across the universe at warp speed. But it's the next best thing—a card that can take your programs and run them at twice the speed of a normal Apple IIGS. It's the Transwarp GS from Applied Engineering, which should be available for under $400 by the time you read this.

The Transwarp GS runs at the lightning-fast speed of 7 MHz, as opposed to the already brisk 2.8-MHz speed of the IIGS in Fast mode. To change the speed, you use the control panel just as you would on an unenhanced IIGS. Instead of just two choices (Normal and Fast), you'll see an additional selection—Transwarp. This is accomplished by the card's built-in ROM, which automatically installs the necessary routines each time you boot the system. There's no need for a preboot or any other special software. The Transwarp GS also has built-in diagnostics; works in any slot, including slot 3; is compatible with all software and hardware; and has a one-year warranty.

If you have a IIe or II+, you needn't feel left out—Applied Engineering has a Transwarp for you, too. With the Transwarp, you can run your software 3.6 times faster than the normal 1-MHz speed, which is a full 40-percent faster than an out-of-the-box Apple IIGS. If necessary, you can switch back to the normal speed by holding down the Escape key as you turn on your computer. The Transwarp is compatible with all software and hardware; works in any slot, including slot 3 on the IIe; and costs $219.

We do have a couple of questions for the folks at Applied Engineering about their two Transwarp boards. When you enter the transwarp speed, do objects go streaming by as they do on "Star Trek" (this could be disorienting when you're writing a letter), and will gravity in the room be affected in any way (we wouldn't want the computer lifting off the table)? Other than that, it's *Batten down the hatches and full speed ahead.*

— David English



The Transwarp GS more than doubles the speed of your Apple IIGS.

Where Do Game Designers Get Their Ideas?

Shay Addams

Hmmmm. . . . What should I write about this time?

Last week one of my editors asked, "Shay, where do you get all those great ideas for articles and columns?" And that gave me a great idea for this column: Where do game designers get their ideas? I posed this question to the designers who created some of my favorite games: *Planetfall* (Steve Meretzky), the Might and Magic series (Jon van Caneghem), and *M.U.L.E.* (Dan Bunten).

Besides the Might and Magic series, Jon van Caneghem's New World Computing is developing a new science fiction role-playing game and is expanding into the board-game market.

Caneghem: The original idea I come up with is always something I'd like to play, because I like to play games myself. It should be something I want to see happen, something that is missing in other people's products, or something I just dreamed up and wondered if it would be possible or not. A lot of ideas come from movies, books, fantasy stuff. I used to play a lot of board games, so much of it comes from that, and from playing Dungeons and Dragons for years, being a DM [the person who creates the adventure and supervises a session for other players]. Also from playing all the other board games, event-driven-type games, and arcade games as well. I was a math major in school and always loved math puzzles. Those work very well with computers.

Addams: That's where the magic square puzzle in *Might and Magic I* came from? [A magic square is a rectangle with rows and columns of boxes, each containing a number, where the sum of all the numbers in each row and column is the same figure.]

Caneghem: Exactly—I was looking through one of my old math books, and I said, "Oh yeah, I can put this into the game." I think it comes from your hobbies, the kind of things you like to think about, or dream about, that might happen. We get a lot of stuff from "Star Trek," which was a big influence for me, as well as from cartoons. I've talked to a lot of authors who watch cartoons. I've noticed influences from things like "Thundar the Barbarian" and "Thunder-Cats," and everything from Gumby to Mr. Peabody—even "Felix the Cat" and the "Flintstones." A lot comes from Monty Python. I think they have the medieval comedy twist that we like as well. All the Python movies are great, and we love trying to incorporate things like that.

The idea for the game itself came when my brother and I were eight or nine and used to line up soldiers and throw dirt clods at them.

The Thundranium in *Might and Magic I* was inspired by "Thunder-Cats." And we used a lot from "Star Trek." One of the clues in the game was *Queen to Queen's Level Three,* which was an access code Captain Kirk had to use to get back on the ship in one of the episodes. So you could either find the clue in the game or watch all the "Star Trek" reruns. A couple of people have called and said they saw that episode. You'll see a lot of stuff in *Might and Magic II.* In one of the castles, we have a Lord Peabody, who, of course, has a time machine—like Mr. Peabody and His Wayback Machine in "The Rocky and Bullwinkle Show." And Sherman is one of characters you have to find in the game. Little things like that are always fun to throw in, instead of just random names that don't mean anything.

Recently, we've been getting a lot of ideas from players who write or call. In *Might and Magic II,* we've got a spell devoted to a guy named Lloyd, who called up and said, "Wouldn't it be nice if I had a beacon I could drop somewhere, which I could then teleport back to at any time?" We thought that was a great idea, so we put a Lloyd Beacon spell in the game.

Addams: Did you figure out exactly what you were going to do throughout the Might and Magic series before you started the first game, or are you making it up as you go?

Caneghem: When I first had the idea for Might and Magic, I had this tremendous grand theme that ended up being whittled down to one-tenth its original size. So a lot more games could theoretically come out of that overall theme, though it has been changing a lot. When you first come up with a concept, it goes on and on, and it goes in all directions. And you kind of draw it out and pick a small portion of that to actually concentrate on for your current project. And you try to pick the best stuff, of course.

Addams: Do you ever go out looking for ideas, to bookstores, for example? David Bowie says he gets a lot of ideas for songs by reading titles of science fiction books.

Caneghem: That's a great pastime of ours, going to unusual bookstores with all these wacky books, maybe mythological or scientific, really off-the-wall stuff. We spend hours skimming through stuff, and you'd be amazed at some of the things you come across. You think you're original, and you find out a hundred years ago someone already beat you to the punch. But I do better with pictures than titles. The covers of books will inspire more ideas than sitting down and reading them.

In fact, that's what we do with the maps of our games. We give the artist a general idea of what we want. After he draws it, I sit down and stare at it and dream up things I think would be going on in these areas. Then I might tell him to draw some creatures here and some places or ominous things there. I think I build a lot of my stuff on visuals, which explains the influence of cartoons.

Dan Bunten, besides creating my all-time favorite game, M.U.L.E., *also did* Seven Cities of Gold, Heart of Africa, *and the recent* Modem Wars.

Bunten: A lot of the ideas come from other games. We start out with research by playing other board games, computer games, and my feeling is that if the shoe fits, steal it. It's not exactly plagiarism: If a good idea is out there, good mechanics for using an interface or the joystick, it's just there for you to pick. If you know the right place to use it, that is.

Other ideas come from play testers. We invite people from local computer clubs to play a new game. We'll watch them play, ask them ques-

tions, and they'll make suggestions. It's good to get other brains involved. I tend to look at something the same way, but if someone else is looking at it, they'll say, "Oh, so that's what that means. But if you want to do that, here's what you should do"—like in *Modem Wars*, a two-player modem game we've just finished. The idea for the game itself came when my brother and I were eight or nine and used to line up soldiers and throw dirt clods at them. It's not a strategy, chess-type game or a historical war game, but kind of a shoot-'em-up.

Initially it was going be a grand, high-intensity, fast-paced war game with lots of strategic options. But the play testers kept saying, "It's neat, but it's too complicated." They'd tell me things I could take out, and before we'd finished, we had reinvented football. We had a game at the beginner level that's kind of a football scrimmage, which is good because war games tend to be kind of daunting, especially to non–war gamers. We ended up with five scenarios that are progressively more difficult, and the first three are football-oriented and came from play testers' suggestions. They make a good segue from something people are familiar with, football, to something a little more sophisticated.

Addams: Where did you get the idea for *Seven Cities of Gold?*

Bunten: That came from a book about the conquistadores that my uncle gave to my brother and me when we were 10 or 11. It was one of those big books you'd read all summer as a kid, and we just got off on it. And it's the kind of thing that stays in the back of your mind, and you just come back to it periodically. I remember seeing a board game called Source of the Nile and thinking, this is kind of neat; if only we could do something like this but associate it with discovering the New World. It was just circling back to an intriguing concept that got us started, then putting things together on the screen, and play testers coming back with ideas.

The interaction with the native chief came from what Cortez did to Montezuma, which was kidnap him until the Aztecs put down their weapons. The trick in *Seven Cities* was to enter a city peacefully and pull your sword (but not kill anybody) before the chief could run away; then they'd give up. It's a real subtle, difficult trick that came from my brother, who was co-designer—a neat connection between joystick and history.

Our sequel to *Seven Cities* was *Heart of Africa*, which was really the publisher's idea. They wanted a sequel and we couldn't come up with a better idea. In my mind, there's not a better idea—there's not a heroic age that dealt with discovery and exploration like the age of the conquistadores. And the game turned out to be not as interesting, which in our minds settled the discussion about why people buy games. It's not because of the quality of the game, but because the title, theme, and packaging hit them—that's 75 percent of it. Then maybe, if you're lucky, 25 percent of your sales can come from the fact that it's a quality product. It's real disheartening, but that's the way the world is.

Addams: Do you consciously go out looking for ideas, or do they just strike you?

Bunten: While in the midst of a product, looking for something to do, we'll read a lot, movies will occasionally trip out an idea. But in one sense I've already got more things that I want to do than I will probably have time for, so it's more of a weeding-out process. Having settled on an idea, I get into real research. I get every related product I can find—books, movies, other computer games. And reading books—occasionally you'll get an idea from a book. The idea for the mechanized M.U.L.E.s in that game was from one of Robert Heinlein's novels.

Board games tend to be a much better creative stimuli than other computer games, because most computer games are pretty tame and don't do anything all that interesting. I can learn a lot more from board games and paper games than from computer games. (I've probably got a bigger collection of board games than computer games.) The designers think through their subjects, figuring, How is it that we're going to simulate this serious, historic aspect in a little model? And that's good stuff, because they're trying to limit a very large subject to something manageable, and that's something you've got to do with a computer game as well.

When we were doing *Heart of Africa*, for instance, we got every African movie we could rent and watched them all. People have expectations of what things should look like or feel like. A good example is the way they showed the computer in the movie *War Games*, with all these banks of flashing LED lights and beeping noises. It was absurdly unrealistic from the perspective of people who know anything about computers, but those are stereotypes in people's minds for how things ought to look if you want to communicate a computer that's thinking—to the mass audience, that is, not an audience of enlightened computer users. So, part of what we're doing when we look at other media is standardizing our perceptions, trying to figure out the base stereotypes or language for communicating whatever subject we're working with.

Steve Meretzky has written some of Infocom's funniest all-text interactive fiction; his latest, Zork Zero, *is Infocom's first illustrated adventure game.*

Meretzky: Ideas sort of percolate in my brain somewhere, and then they just pop out. I don't really understand that well where they come from. I'm not sure I really want to know. It's like the time someone asked a centipede, How do you know which legs to move? and he couldn't even walk after that. So I think being creative is two things: generating huge amounts of ideas, then discriminating among them and deciding which are good ones and which are the crummy ones.

One source is certainly other media—reading, watching movies, and so on. The giant microbe in *Planetfall* was an idea I got from a 1930s science fiction story that I think was by Edmund Hamilton. I don't recall the title, but it was an Incredible Shrinking Man kind of story in which the main character had a run-in with a microbe. And the whole testing process is great for coming up with ideas, compared to when you're writing the first draft and you're pretty much holed up alone. You're dealing with people on a daily or hourly basis, and the entire process of fixing bugs can generate so many ideas because you're forced to say, "That won't work, I need to come up with with another way." And a lot of times it turns out even better than the first way—or at least more entertaining.

Addams: Where did some of the ideas in *Zork Zero* originate?

Meretzky: There's a graphic game in it called Peggleboz—a game of jumping pegs. Remember a game from 10–15 years ago called Hi-Q? You have a board of pegs, and you jump over them until you have one peg left. Peggleboz is a variation on that, which I came up with while viewing an exhibit of classic puzzles that was going around the country last fall. They had a whole range of these different peg-jumping games.

Then there's a logic puzzle that comes from *Don Quixote*, a scene in which Sancho is governor of an island with a rule that says all visitors there have to state their business. If they do so truthfully, they live, but they are hung if they tell a lie. And a guy arrives who says, "My business here is to be hung." And of course, if he's telling the truth, he can't be hung. And if he's lying, he deserves to be hung—but if he's hung, he was really telling the truth, so he shouldn't have been hung. So they're left with a contradiction no matter what they do. This puzzle is a variation on that. aa

Tips, Tricks, & Tidbits

"Tips, Tricks, & Tidbits" serves up a wealth of information on programming and applications software for the Apple II series of personal computers. This issue, we've collected a wide assortment of programming hints and tips, from protecting your programs to manipulating the hi-res screen.

More Program Security

Here are two supplements to the tips found in the October 1988 "Tips, Tricks, & Tidbits" column.

No Way Out. Lionel H. Layton provided the following line of code to prevent you from breaking out of your BASIC programs:

```
Ø POKE 1Ø1Ø,1Ø2:POKE 1Ø11,213:P
  OKE 1Ø12,112:ONERR GOTO Ø
```

As printed, this tip works in DOS 3.3 only. If used in conjunction with ProDOS, Control-Reset not only reruns the program, but it enters TRACE mode. With my tip, you can use this program-security trick in ProDOS. All you need to do is add the following program line:

```
1 NOTRACE:HOME
```

Rebooting Reset. In the same issue, Thomas McQuitty contributed the following POKEs:

POKE 1011,0:POKE 1012,0

After these commands have been entered, the computer reboots when Control-Reset is pressed. These POKEs do not prevent the user from breaking into your program by pressing Control-C, however. To prevent the use of Control-Reset *and* Control-C, use the code

```
Ø POKE 1Ø11,Ø:POKE 1Ø12,Ø:ONERR
   GOTO 6ØØØØ
6ØØØØ IF PEEK(222)=255 THEN RES
      UME
```

and place your program between lines 0 and 60000.

Line 0 uses Mr. McQuitty's rebooting reset tip and executes an ONERR GOTO command to trap Control-C. Now, whenever Control-C is pressed, line 60000 resumes normal program execution.

James W. Moore

List Killer

One of the best ways to prevent people from listing your BASIC programs is to place the instruction

POKE 214,128

in the first line. This POKE causes the Apple to run the program in memory whenever an immediate-mode command, such as LIST, is executed. If your program ever stops, it can't be listed if this POKE has been used. ProDOS and DOS 3.3 commands such as SAVE and LOAD still work as usual.

There are two ways to reverse the effects of this POKE. The easiest way is to reboot the computer. This, of course, erases the program currently in memory. The other way is to run a program that contains the instruction POKE 214,0.

Greg Bowers

Protecting Files

If you have a program that you don't want other people to have access to, try using control characters, such as Control-A or Control-F, in your filenames. These characters won't appear in the disk's catalog, and you can't load the program by entering the letters that do appear. To access such a file, you must enter the filename exactly as saved—control codes and all.

Some control codes cannot be used in filenames. These codes include Control-X, which cancels input, and Control-M, which is the same as pressing Return.

Dennis McClain-Furmanski

High to Low

If you've ever wondered what a hi-res picture would look like in lo res, insert a disk with a hi-res picture file on it and enter the following commands:

BLOAD *filename*,$A2000
GR
CALL −151
400<2000.2400M

Be sure to press Return after each line.

Mike Bitz

Hi-Res Hijinks

Here's a quick and easy way to invert and/or swap the Apple's hi-res screens. To begin, type in the following BASIC loader and save a copy to disk:

```
1ØØ SA = 768: FOR I = SA TO SA
    + 95: READ D: POKE I,D: NEX
    T
11Ø REM INVERT ROUTINE
12Ø DATA 162,Ø,134,Ø,134,2,162,
    32
13Ø DATA 134,1,16Ø,Ø,177,Ø,73,2
    55
14Ø DATA 145,Ø,2ØØ,192,Ø,2Ø8,24
    5,166
15Ø DATA 2,224,31,24Ø,11,232,13
    4,2
16Ø DATA 166,1,232,134,1,24,144
    ,228
17Ø DATA 96
18Ø REM SWAP ROUTINE
19Ø DATA 162,Ø,134,4,134,Ø,134,
    2
2ØØ DATA 162,32,134,1,162,64,13
    4,3
21Ø DATA 16Ø,Ø,177,Ø,133,5,177,
    2
22Ø DATA 145,Ø,165,5,145,2,2ØØ,
    192
23Ø DATA Ø,2Ø8,239,166,1,232,13
    4,1
24Ø DATA 166,3,232,134,3,166,4,
    232
25Ø DATA 134,4,224,32,2Ø8,22Ø,9
    6
```

When run, this program stores two machine language routines into memory, starting at location 768 ($0300). Now, to invert (make the light pixels dark and the dark pixels light) hi-res screen 1, execute a CALL 768. To swap the contents of hi-res screen 1 with the contents of hi-res screen 2, enter CALL 809.

(In order to see the inversion or swap, you must be viewing the correct hi-res screen.) With some imagination, you can use these routines to create a variety of special effects.

If you like, you may relocate these routines simply by changing the variable SA in line 100.

Ulli Hernando

aa

Database or Spreadsheet?

Steve High

The obvious choice isn't always the best.

One of the first things you learn about *AppleWorks* is that it offers more than one way to do things. The next thing you learn is that the obvious way isn't always the best.

Suppose you want to select Quit from the main menu. You can press the down-arrow key five times, which is fine, but you can also press the up arrow just once. Both operations highlight the Quit option, but the latter method is easier.

If you want to balance your checkbook and keep track of your spending for budgeting and tax purposes, you can use either the spreadsheet or the database. The spreadsheet seems to be the obvious solution, but the database is better.

Choosing which of *AppleWorks* tools you should use—database or spreadsheet—is a tough choice. Deciding between the database and spreadsheet requires a knowledge of their strengths and weaknesses, as well as a knowledge of your own ability.

Deciding Which Is Best

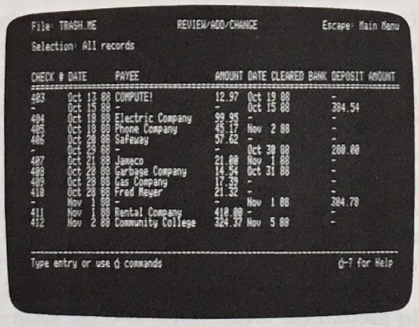
Consider first the strengths of the database. One of its finest features is its ability to accept date and time information from a variety of sources, standardize this information into a single readable format, and then sort records by date, time, or both. The spreadsheet has no way to automatically sort records chronologically; you could write formulas to accomplish this, but it would be painfully difficult. Even alphabetic and numeric sorting can be awkward with the spreadsheet.

One of the database's strongest features is its group-totals function. This is probably the single best reason to choose the database over the spreadsheet. Even intermediate and advanced *AppleWorks* users sometimes fail to appreciate the tremendous power of this command.

The spreadsheet's two great strengths are its sheer number-crunching power and its ability to display huge amounts of data. You can also calculate exponents, figure square roots, determine net values projected over time, and perform several other math functions not available in the database. You can leverage the spreadsheet's powerful formula-building power by copying a single formula across rows or down columns. And you don't have to print to screen to see the results of your calculations.

The database is limited to 30 categories; the spreadsheet has more than 12,000 cells (127 rows × 999 columns). The spreadsheet can be used as an oversized database when you need more than 30 categories, although you won't have the record selection, sorting, and grouping power of the database. Record selection can be mimicked with the @IF function, but the @IF function works with numbers only.

Overall, the database is better at sorting and grouping data, while the spreadsheet is better at mathematical calculations and displaying results. The database is generally a faster and friendlier way to manipulate data if you don't need spreadsheet math functions and your application leans more heavily on sorting and selecting than upon numeric calculations.



This sample checkbook register was created using the AppleWorks *database.*

A Checkbook Database

At first glance, checkbook balancing might appear to be a job for the spreadsheet. Instead of using the spreadsheet, however, I'm going to show you how to balance your checkbook with the database.

Why did I choose the database? Balancing a checkbook is simply a matter of adding and subtracting numbers, and the database can handle that with ease. Besides, sorting and selecting checks by date, check number, and expenditure category, as well as comparing your records to those of your bank, are operations best suited for the database. But are 30 categories (the database's limit) enough? The answer is *yes*—if you plan your database correctly.

Let's create a checkbook database. Start by adding a new database file to the desktop with the following categories:

CHECK #:
DATE:
PAYEE:
AMOUNT:
DATE CLEARED BANK:
DEPOSIT AMOUNT:
SPARE:
SPARE:
SPARE:

The use of SPARE categories allows you to add categories later without losing custom layouts or report formats. It's a useful trick whenever you build a new database.

After you've entered some checks, you can compare your records to those of the bank. Enter the month and year of the bank statement in the DATE CLEARED BANK category for every check the bank shows. Now, to prepare an outstanding-check list, create a report that contains the record-selection rule *DATE CLEARED BANK is blank*. Here's how you do it.

Press Open Apple–P to get to the report format menu. When you've created the report, press Open Apple–P again to see the results. Create a new tables-style report and delete all but the first five categories. Next move the cursor to the AMOUNT category and total it with Open Apple–T. *AppleWorks* will display a row of 9s on the screen in the amount category. You won't see the actual total until you print your report to the screen. Move the cursor to the DEPOSIT AMOUNT category and use Open Apple–T again.

Finally, use Open Apple–R (Records) to install a record-selection rule, *DATE CLEARED BANK is blank*.

Use Open Apple–P to print to the screen and you'll see a list of your outstanding checks (the ones the bank doesn't know about) displayed on the screen, with a total at the bottom. Your outstanding deposits will also be displayed.

Now, to see the power of group totals, return to your report and remove your record-selection rule by pressing Open Apple–R and answering *yes* to the *Select all records* question. Position the cursor on the DATE CLEARED BANK category and press Open Apple–G (Group). Answer *yes* to the *Group totals only* question. Now, press Open Apple–A (Arrange). Answer *chronological* to the *Arrangement order* question.

Because you've already selected the categories to total (AMOUNT and DEPOSIT AMOUNT), you're ready to print to the screen. The group-totals function requires at least two categories and three steps: You need a category to group on, you need to sort the data in that category, and you need a category to total with Open Apple–T.

Print to the screen and you'll see a valuable summary of the information in your database—totals of all the checks and deposits your bank knows about, totals of all the checks and deposits it doesn't know about, and grand totals. If the first set of totals agree with the totals on your statement, then your records are as accurate as you can make them at this point. There may still be an error in your outstanding checks and deposits, but you won't know that until your next statement.

Assuming for the moment that your numbers and the bank's numbers agree, you can now calculate your balance to the penny in seconds. Press Escape to return to your report. Temporarily delete all categories except for DATE CLEARED BANK, AMOUNT, and DEPOSIT AMOUNT. Use Open Apple–K (Kalculate, *AppleWorks'* most inspired mnemonic) to create a calculated category. Call this category BALANCE. Next you need to write a formula that subtracts AMOUNT from DEPOSIT AMOUNT. If AMOUNT is A and DATE CLEARED BANK is B and DEPOSIT AMOUNT is C, then your formula is C − A.

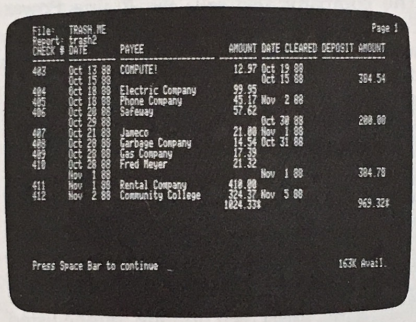
Print your report to the screen, and the bottom line will show the total number of checks you've written to date, the total number of deposits, and your current balance. Notice that the figures in the BALANCE category are meaningless until they're totaled.

If you'd like to see just the bottom line, change your *Group totals only* designation from DATE CLEARED BANK to one of the empty SPARE categories.

What if your totals and the bank's totals are different? Then you have to return to the multiple-record layout in Review/Add/Change to find where the discrepancy lies. If you have fewer deposits than checks (and who doesn't?), check your deposits first, one by one, looking first at the computer, then at your bank statement. Each time you make a correction, print the balance report to the screen to see if your totals agree. Sometimes it's helpful to subtract your totals from the bank's to see if a single transaction is producing the error. For example, if you're exactly $6 dollars off, perhaps you forgot to enter the bank's monthly service charge into your database (treat it like a check).

In a short time, your checkbook should agree with the bank statement.

Unlike the spreadsheet, the database's multiple-record layout can display only about eight inches of information at a time and will not scroll. But you'll find that a database checkbook outperforms a spreadsheet checkbook in almost every other way.



Using the database's totals function, we've calculated the total amount for checks and deposits.

What Not to Do

Sometimes people begin an application in the database and then move to the spreadsheet in order to get more than 30 categories. Someone who has a small business might head for the spreadsheet after having created a database file that looks like this:

File: WRONG CHECKBOOK
Page 1
Report: CATEGORIES

CHECK #:	**UTILITIES:**
DATE:	**INSURANCE-GEN.:**
PAYEE:	**INSURANCE-HEALTH:**
AMOUNT:	**MAINTENANCE:**
PURPOSE:	**EQUIPMENT RENTAL:**
FURNITURE:	**OFFICE EXPENSE:**
AUTOMOTIVE:	**ADVERTISING:**
NOTES PAYABLE:	**BUSINESS PROMOTION:**
DRAW:	**AUTOMOBILE EXPENSE:**
BUYOUTS:	**TRAVEL:**
SALARIES:	**ENTERTAINMENT:**
PAYROLL TAXES:	**LEGAL:**
RENT:	**DUES:**
CONSULTING:	**SUBSCRIPTIONS:**
TELEPHONE:	**CONTRIBUTIONS:**

The problem here is not that the database permits only 30 categories, but that the categories have not been selected with a view toward the ultimate report. Even if the database allowed 90 categories, a file designed as shown above would not work as well as this one:

File: RIGHT CHECKBOOK
Page 1
Report: CATEGORIES
CHECK #:
DATE:
PAYEE:
AMOUNT:
PURPOSE:
ACCOUNT NAME:
ACCOUNT NUMBER:
DEPOSIT AMOUNT:

Using this design, you can enter checks with the account name (business promotion, rent, payroll taxes, and so on) as data instead of a category name. You can total checks by account name at the end of the month, quarter, or tax year. It also makes entering data easier since you don't have to scroll through a laundry list of categories.

Use group totals to sort and summarize your records for tax and budgeting purposes just as you would to sort checks that have (or have not) cleared the bank.

For home bookkeeping, your chart of accounts may be simple enough to keep in your head: rent, insurance, medical, food, clothing, car, and entertainment. A chart of accounts is simply a way to categorize every check you write. The checkbook database shown above can be easily modified to work for either a small-business or a personal bank account.

Regardless of the number of spending categories you wish to keep track of, however, you should put them all in a single database category so you can take advantage of group totals. The group-totals function is the single most important reason for using the database instead of the spreadsheet. It's fast, easy to use, and hard to mess up. As shown in the checkbook example, this function permits a huge number of subcategories within a single database category. A second important strength of the database is the ability to sort by time and date. It's weak in overall math functions and in displaying the effect of one calculation upon another (what-if situations).

The spreadsheet has many more math functions, it displays calculations as you make them, and it scrolls from right to left to display as many as 127 columns of data. It's weaker at handling text and at sorting and selecting generally. It's the obvious place for your checkbook register, but, as I've shown here, it's not the best. aa

Readers' Feedback

"Apple Feedback" replies to your questions and comments about hardware and software.

Running from RAM

I'm the owner of an Apple IIc. I have a game that uses two separate BASIC programs—the first program runs for a while, and then it runs the second program. The second program runs for a while, and then it runs the first program, and so on. All this results in a lot of wear and tear on my disk drive. I would like to use something that will allow me to run the two programs from my ramdisk.

Alan Graff
Wheelersburg, OH

Unlike other versions of DOS, ProDOS has no command to copy a program from one disk to another. With ProDOS, files are usually copied using the System Utilities disk.

For your purpose, you'll probably want to LOAD the files and then SAVE them to the ramdisk. Type the following commands in direct mode to accomplish this:

LOAD PROGRAM1,S6
SAVE /RAM/PROGRAM1
LOAD PROGRAM2,S6
SAVE /RAM/PROGRAM2

If your ramdisk is not named /RAM, simply substitute the proper name.

Depending on how the programs were written, you may be able to run the game by typing ***RUN /RAM/PROGRAM1****. Try this first. If it works, you've found your solution—there's no need to do anything further. But if your Apple still tries to load the programs from the disk drive, read on.*

If your Apple tries to load the programs from the disk drive, the problem is in PROGRAM1 and PROGRAM2. Look through PROGRAM1. Somewhere within the code you'll probably find one or more statements similar to RUN PROGRAM2,S6 or RUN /SOMEVOLUME/PROGRAM2. RUN PROGRAM2,S6 tells ProDOS to look for PROGRAM2 in slot 6 (the disk drive). RUN /SOMEVOLUME/PROGRAM2 tells ProDOS to look for PROGRAM2 on a disk named /SOMEVOLUME. You need to tell ProDOS to look for the program in /RAM, so change all these statements to ***RUN /RAM/PROGRAM2*** *and save the modified program to a different disk.*

Modify PROGRAM2 in the same way. Change all RUN statements to ***RUN /RAM/PROGRAM1*** *(remember that PROGRAM1 runs PROGRAM2 and PROGRAM2 runs PROGRAM1). Once this is done, save PROGRAM2 to the disk that contains the modified version of PROGRAM1 (for safety's sake, it's better not to copy over the original programs). If you've changed all the RUN statements properly, your game will work from the ramdisk. Simply use the instructions above to copy both programs to the ramdisk, and then enter* ***RUN /RAM/PROGRAM1****.*

Feedback on Feedback

I looked through "Readers' Feedback" in the August issue of *COMPUTE!'s Apple Applications* and found a few things worth commenting on.

Regarding the "Old Warhorse" letter, an Apple II+ *can* run ProDOS. The only requirement is that it have 64K (using the language card, for example), since the ProDOS kernel loads into auxiliary memory.

As for the "Portable Computers" section, a company by the name of Roger Coats sells a liquid-crystal screen for the Apple IIc called the C-Vue (it also fits the Laser EX). In fact, Roger Coats has carved quite a niche for itself by specializing in portable IIc systems. The company also sells the Prairie Power Supply (a portable power supply for the IIc), as well as a carrying case designed to contain all of the computer's components. The company made an impression on me because when I called with a question that the order clerk couldn't answer, Roger Coats himself picked up the phone to answer my question. The Roger Coats company can be reached through Roger Coats, P.O. Box 171466, San Diego, CA 92117; (800) 438-2883 for orders or (619) 274-1253 for prices and technical questions.

Lastly, the screen printing routine listed under "Screen Dumps" works better with a Grappler+ if you change "80N" to "0N" in line 60060. To return to the 80-column screen without clearing the screen, use the command PRINT CHR$(4)"PR#A$C307". This is the soft entry point into the 80-column display. The command PR#3 activates 80-column mode and clears the screen.

Rick Pedley
Kingston, Ont.

Thank you for your comments. We always like to see our mistakes corrected and our ideas improved upon.

Color Control

I own an Apple IIGS. I know how to change the background, border, and text colors from the control panel, but how do I do it from within a program? Is there a simple POKE I can use?

Anonymous

The register that controls the Apple IIGS's text and background color is located at 49186 ($C022). The upper four bits control the text color, and the lower four bits control the background color. The border color is controlled by the lower four bits of memory location 49204 ($C034). Unfortunately, Applesoft BASIC doesn't provide an easy means of changing these bits. This sort of bit fiddling is easy with machine language, however. For example, type in the following program:

```
10 CK = 0: FOR I = 768 TO 768 +
   54
20 READ JF:CK = CK + JF: POKE I
   ,JF: NEXT
30 IF CK = 6481 THEN HOME : PRI
   NT "Color routines activated
   ": NEW
40 PRINT "Error in data stateme
   nts:end
100 DATA 165,236,41,15,133,236,
    173,34
110 DATA 192,41,240,5,236,141,3
    4,192
120 DATA 96,165,236,41,15,133,2
    36,173
130 DATA 52,192,41,240,5,236,14
    1,52
140 DATA 192,96,165,236,41,15,1
    0,10
150 DATA 10,10,133,236,173,34,1
    92,41
160 DATA 15,5,236,141,34,192,96
```

This program POKEs three machine language subroutines into memory. The routine to change the background color begins at 768 ($300), the routine to change the border color begins at 785 ($311), and the routine to change the text color begins at 802 ($322). To use these routines, POKE a color number (0–15) into memory location 236 ($EC) and CALL the appropriate routine. The color values are as follows:

Number	*Color*	*Number*	*Color*
0	*black*	*8*	*brown*
1	*red*	*9*	*orange*
2	*blue*	*10*	*light gray*
3	*purple*	*11*	*rose*
4	*dark green*	*12*	*green*
5	*dark gray*	*13*	*yellow*
6	*light blue*	*14*	*cyan*
7	*periwinkle*	*15*	*white*

To change the border color to periwinkle, for example, enter the command ***POKE 236,7:CALL 785****.*

Two-Drive Dilemma

I own an Apple IIc and recently bought an external 5¼-inch disk drive. How do I load programs from it?

Edward Byon
Hamilton, Ont.

You can use the same commands for the external drive that you use for the internal drive; just append a ,D2 to the command. For instance, to get a directory listing of the external drive, type

CATALOG,D2

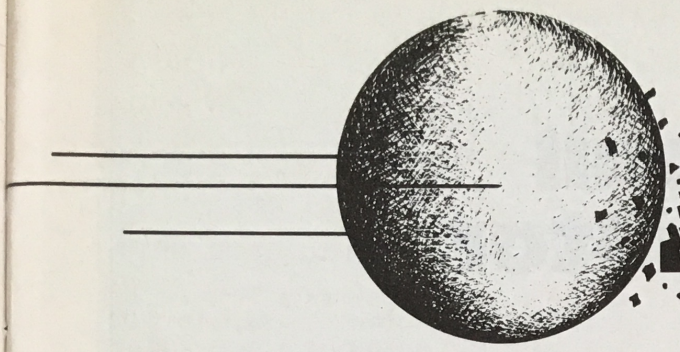
Similarly, to load from or save to the external drive, type

LOAD *filename*,D2

or

SAVE *filename*,D2

aa



Powerball

William Chin

This outstanding arcade-style game's special features and different game screens will keep you thinking and moving fast.

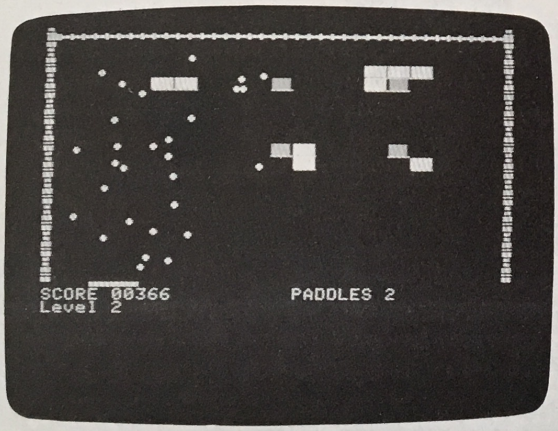
Not your ordinary version of *Breakout*, "Powerball" is an addictive, multifaceted arcade-style game with eight different screens, falling *capsules* that give you special powers, and an editor for designing custom screens.

Each Powerball screen is populated by its own configuration of capsules and bricks. After a few games, you'll begin to develop strategies for each of the screens. As in *Breakout*, the object of the game is to destroy a series of walls brick by brick by using your paddle to bounce balls against the wall. Unlike *Breakout*, Powerball requires that you quickly observe the characteristics of each type of screen object to earn high scores.

Power Up

Powerball is written in machine language, so you'll need to use "MLX," the machine language entry program found elsewhere in this issue. When you run MLX, you're asked for the starting and ending addresses of the data you'll be entering. When MLX prompts you, respond with the values given below.

Starting Address: 6000
Ending Address: 76B7

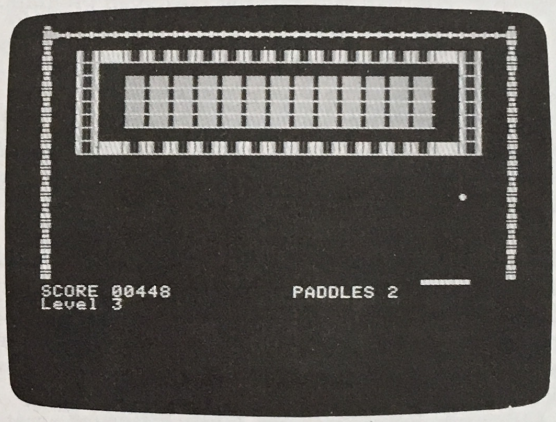


The player has just captured the M capsule, causing the ball to explode into 29 separate projectiles.

Select E from the MLX options menu and then enter the address where you would like to start. If you're just beginning to enter Powerball, type **6000**. After you've finished typing in the program, save a copy to disk before leaving MLX. Be sure to save this file as POWER.

To play Powerball, enter **BRUN POWER**. Press P if you're using paddles; press any other key to use the keyboard. Use game controller 0 to move your paddle. With the keyboard, the J, K, L, and ; keys control the paddle. Press K or L to move the paddle slowly. Keys J and ; are for rapid movement.

When the game begins, a paddle appears near the bottom of the screen. Below the paddle you'll see an indication of the number of paddles remaining, your current score, and the level. (Note: Apple IIGS owners must turn on the alternate display mode by pressing Control–Open Apple–Escape and selecting this option. If you don't have the alternate display mode active, 2s will fill the text window.) You begin each game with four paddles available (only one can be active at any given time, however). Click the button or press the space bar to release the ball and begin play.



Here's one of the game's more difficult screens.

Blasting Bricks

Your weapon against the bricks is the bouncing ball. Use your paddle to keep the ball in motion. You'll lose a paddle whenever a ball gets past you to the bottom of the screen. The game ends when all paddles have been lost. When all breakable bricks on the current level have been eliminated, you advance to the next level.

Bricks come in three varieties: soft, hard, and indestructible. Soft bricks are white and are destroyed by being hit by a ball. Hard bricks start out purple and must be struck six times before they can be destroyed. After five hits, a hard brick turns white, and the sixth hit destroys it. Indestructible bricks are piano key–patterned. They can be destroyed only by a power ball (described below). However, it's not necessary to destroy the indestructible bricks to advance to the next round.

Power Capsules

Capsules are blue blocks with white letters. They appear at random times and random locations near the top of the screen, and then they descend the screen vertically. Touching

Powerball Screen Editor

William Chin

"Powerball Screen Editor" is a BASIC program that allows you to create your own "Powerball" game screens. By laying down brick patterns, you choose how easy or hard the game is. Want to see what it's like to blast through a spiral of bricks or break down a fortress of soft bricks just so you can crack the hard one located inside? With the screen editor, you decide the brick patterns, so you decide how the game plays.

Use the "Apple Automatic Proofreader," found elsewhere in this issue, to type in Powerball Screen Editor. Save a copy to disk before you run the program. When you run Powerball Screen Editor, it loads the Powerball program file POWER, so be sure to save the screen editor to the same disk that contains the Powerball program.

Screen Editing

Editing commands are displayed at the bottom of the screen. A large flashing brick appears in the upper left corner of the screen, indicating your current position. Each time you move, a brick is placed on the screen.

The number keys 1, 2, 3, and 0 change the type of brick that you place. Select 1 for soft bricks, 2 for hard bricks, 3 for indestructible bricks, and 0 or the space bar for blanks (no bricks). Use the arrow keys to place bricks. When the program is first run, the screen is empty. Press Escape to make a simple screen with two rows of soft bricks.

Although Powerball has eight different screens (called *boards* by the screen editor), the screen editor allows you to edit only four. The board number (1–4) is displayed in the lower portion of the screen. To move to the next board, press =. Press − to return to the previous board. When you've finished designing all four boards, press S to save them to disk. Powerball screen files are given a .P extension when saved.

Blank boards or ones that contain only indestructible bricks are impossible to play. So if you don't want to design all four screens, move to each blank screen and press Escape. This way, all screens will be playable.

Press P to run Powerball and try out your new screens. When the last ball is lost, you're asked, *Play again (y/n)?* Press Y to play again or N to return to the screen editor. (There's no way to abort the game in the middle of play.) *Do not* press Control-Reset to exit the game. This corrupts the screen-editor program.

Other commands are C, for disk catalog; L, for load; and B, for buffer. The load option allows you to load and play previously designed screens. You can copy a screen from one file or from one board to another using the buffer command. Press B to store the current screen into the buffer, load another file, or change the board number, and then press G to paste the buffer contents into the current screen.

Program Key

Key	Function
Escape	Create simple screen
Delete	Clear screen
1	Soft bricks
2	Hard bricks
3	Indestructible bricks
0	Empty spaces
Space	Empty spaces
−	Previous screen
=	Next screen
L	Load screen file
S	Save screen file
C	Disk catalog
P	Play Powerball
B	Store to buffer
G	Get from buffer

Powerball Screen Editor

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```
D4 100 REM COPYRIGHT 1989 COMPUTE! PUBLICATIO
       NS, INC. ALL RIGHTS RESERVED.
D4 110 PRINT CHR$ (21): HOME : PRINT "COPYRIG
       HT 1989": PRINT "COMPUTE! PUBLICATIONS
       , INC.": PRINT "ALL RIGHTS RESERVED.":
        PRINT : PRINT "ANY KEY TO CONTINUE":
       GET C$: HOME
84 120 PRINT : PRINT CHR$ (4)"BLOAD POWER"
A0 130 HIMEM: 8192: FOR I = 0 TO 1279: POKE 3
       0720 + I,0: NEXT I
96 140 MX = 7 * 4096 + 15 * 256 + 64:MY = MX
       + 1:BOARD = MX + 2
C6 150 BN = 0
8E 160 MAP = 7 * 4096 + 8 * 256:BM = 7 * 4096
        + 12 * 256:GM = BM + 256
FF 170 HOME : HGR : POKE BOARD,BN
69 180 VTAB 21: PRINT "BOARD #"BN + 1"      (S
       )AVE  (B)UFFER STORE": PRINT "<ESC>DEF
       AULT (C)AT   (G)ET BUFFER"
E0 190 PRINT "<DEL> CLEAR  (P)LAY  - OR = CHA
       NGE BOARD";
0E 200 PRINT "(L)OAD        (Q)UIT  1,2,3,0 BR
       ICK TYPE";
6A 210 POKE 24588,1
6A 220 T = MAP + BN * 256: FOR I = 0 TO 255:
       POKE BM + I, PEEK (T + I): NEXT
43 230 CALL 24582:P = PEEK (BM + 19):X = 0:Y
       = 1:B = 0
E4 240 IF P > 8 THEN P = 1
44 250 POKE MX,X: POKE MY,Y:T = BM + X + Y *
       19:V = PEEK (T): POKE T,1 - SGN (V): C
       ALL 24579: POKE T,P: CALL 24579
4C 260 A = PEEK (49152)
0C 270 IF A < 128 THEN 250
C3 280 A = A - 128: POKE 49168,0
6C 290 IF A = 8 THEN IF X > 0 THEN X = X - 1:
        GOTO 250
```

```
D3 300 IF A = 21 THEN IF X < 18 THEN X = X +
       1: GOTO 250
14 310 IF A = 11 THEN IF Y > 1 THEN Y = Y - 1
       : GOTO 250
41 320 IF A = 10 THEN IF Y < 12 THEN Y = Y +
       1: GOTO 250
F3 330 IF A = 27 THEN GOSUB 510: GOTO 230
2F 340 IF A = 127 THEN FOR I = BM TO BM + 255
       : POKE I,0: NEXT : CALL 24582: GOTO 26
       0
2F 350 IF A = 32 OR A = 48 THEN P = 0: GOTO 2
       50
ED 360 IF A = 49 THEN P = 1: GOTO 250
E9 370 IF A = 50 THEN P = 6: GOTO 250
ED 380 IF A = 51 THEN P = 8: GOTO 250
82 390 IF A > 96 AND A < 123 THEN A = A - 32
86 400 IF A = 80 THEN GOSUB 780: CALL 24576:
       GOTO 140
74 410 IF A = 76 THEN 560
93 420 IF A = 83 THEN 640
F9 430 IF A = 67 THEN 790
1D 440 IF A = 81 THEN TEXT : HOME : END
15 450 IF A = 45 OR A = 95 THEN IF BN > 0 THE
       N GOSUB 780:BN = BN - 1: GOTO 170
E4 460 IF A = 61 OR A = 43 THEN IF BN < 3 THE
       N GOSUB 780:BN = BN + 1: GOTO 170
B6 470 IF A = 66 THEN FOR I = 0 TO 255: POKE
       GM + I, PEEK (BM + I): NEXT : GOTO 250
15 480 IF A = 71 THEN FOR I = 0 TO 255: POKE
       BM + I, PEEK (GM + I): NEXT : GOTO 230
26 490 GOTO 260
51 500 REM DEFAULT SCREEN
7A 510 FOR I = BM TO BM + 37: POKE I,0: NEXT
06 520 FOR I = BM + 38 TO BM + 75: POKE I,1:
       NEXT
D6 530 FOR I = BM + 76 TO BM + 255: POKE I,0:
        NEXT : RETURN
E8 540 HOME : VTAB 21: PRINT T$;: INPUT ",ENT
       ER FILE NAME ";F$: IF RIGHT$ (F$,2) <
       > ".P" THEN F$ = F$ + ".P"
78 550 PRINT : RETURN
8A 560 T$ = "LOAD FILE": GOSUB 540: IF F$ = "
       .P" THEN 170
11 570 ONERR GOTO 600
E5 580 PRINT CHR$ (4)"BLOAD "F$
A5 590 POKE 216,0: GOTO 170
32 600 PRINT "LOAD ERROR, ? FOR CATALOG": PRI
       NT "SPACE TO TRY AGAIN, OTHER KEY CANC
       ELS"
AF 610 GET C$: IF C$ = "?" THEN 790
4B 620 IF C$ = " " THEN 560
9A 630 POKE 216,0: GOTO 170
C1 640 GOSUB 780:T$ = "SAVE FILE": GOSUB 540:
        IF F$ = ".P" THEN 170
3E 650 ONERR GOTO 710
E8 660 PRINT CHR$ (4)"VERIFY "F$
B7 670 PRINT "FILE EXISTS, SAVE OVER IT (Y/N)
       ?"
3C 680 GET C$: IF C$ = "n" OR C$ = "N" THEN P
       OKE 216,0: GOTO 170
E4 690 IF C$ = "Y" OR C$ = "y" THEN 710
1B 700 GOTO 680
B7 710 ONERR GOTO 750
EA 720 PRINT
E8 730 PRINT CHR$ (4)"BSAVE "F$",A$7800,L$040
       0"
9D 740 POKE 216,0: GOTO 170
C0 750 PRINT "SAVE ERROR, R TO RETRY"
B2 760 GET C$: IF C$ = "R" OR C$ = "r" THEN 6
       40
A3 770 POKE 216,0: GOTO 170
FD 780 T = MAP + BN * 256: FOR I = 0 TO 255:
       POKE T + I, PEEK (BM + I): NEXT : RETU
       RN
A8 790 GOSUB 780: HOME : TEXT
A6 800 ONERR GOTO 840
0A 810 IF PEEK (48896) = 76 THEN PRINT CHR$ (
       4)"CAT": GOTO 830
BE 820 PRINT : PRINT CHR$ (4)"CATALOG"
3E 830 PRINT "ANY KEY TO CONTINUE": GET C$: P
       OKE 216,0: GOTO 170
9F 840 PRINT "DISK ERROR, ";: GOTO 830
```

a capsule with your paddle gives the paddle a special ability depending on the capsule's type. Below is a list of the capsule types and their corresponding powers.

Label	Power
S	Slows down all balls
C	Paddle catches balls
L	Long paddle
P	Balls become power balls
3	Keeps three balls in play
M	Ball splits into 29 balls
W	Wall width paddle
E	Extra paddle
N	Go to next screen

A paddle can have only one power at a time; the previous power is lost each time a new capsule is touched. The special power is also canceled when the paddle is lost.

A few notes about the powers: When you've caught the C capsule, your paddle will capture the ball so that you can reposition the paddle for an accurate shot. Press the paddle button or the space bar to release the ball. If you wait too long (about one second), the ball will be released automatically. The P capsule turns the balls into power balls, which destroy *all* types of bricks. The 3 capsule splits the ball into three individual balls. Each time you lose a ball, another ball is created to replace it. You are allowed 50 misses before the balls stop splitting. If you think playing three balls at once is difficult, try catching capsule M for multiball—this capsule explodes the ball into 29 separate balls, and you won't lose a paddle until all the balls are lost. The E capsule adds an extra paddle to your total when touched. Touching an N capsule takes you to the next level, regardless of how many bricks remain on the current level. The E and N capsules are rare.

Powerball

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```
6000: 4C 0D 60 4C 87 69 4C 5E D3
6008: 69 4C 0D 60 00 A5 EC 8D 36
6010: 28 77 A5 ED 8D 29 77 A5 FB
6018: E6 8D 2A 77 A5 E7 8D 2B 7F
6020: 77 A5 EE 8D 2C 77 A5 EF 37
6028: 8D 2D 77 20 D3 73 D8 20 2A
6030: CE 74 20 47 6E 20 80 74 57
6038: A9 00 8D C1 7E 20 E9 60 44
6040: 20 5E 69 A9 FF 8D 8A 6D 29
6048: 20 FC 75 20 4E 67 20 79 D2
6050: 6A 20 72 61 20 69 72 20 5E
6058: 39 67 AD 8A 6D 30 EC C9 BD
6060: 01 F0 CF C9 6F F0 CE 20 71
6068: F1 72 F0 C3 60 AE 41 7F D8
6070: BD 79 60 18 6D 40 7F A8 10
6078: 60 00 13 26 39 4C 5F 72 5A
6080: 85 98 AB BE D1 E4 E4 E4 5C
6088: E4 E4 E4 E4 A9 00 8D 72 BA
6090: 6D BD 40 7D 18 7D 80 7D 8C
6098: 9D 40 7D 08 BD 80 7D 30 83
60A0: 16 28 90 2B FE 60 7D EE 9E
60A8: 73 6D BD 60 7D C9 26 90 2C
60B0: 1E EE 72 6D 4C D0 60 28 EF
60B8: B0 15 CE 73 6D DE 60 7D 4D
60C0: D0 0D CE 72 6D A9 00 9D DD
60C8: 40 7D A9 01 9D 60 7D 60 18
60D0: BD 00 7E 9D 40 7D BD 20 AD
```

```
60D8: 7E 9D 60 7D BD C0 7D 9D AD
60E0: 00 7D BD E0 7D 9D 20 7D E6
60E8: 60 A2 1F A9 00 8D 67 6D 73
60F0: AD 0F 69 4A 8D 0D 69 A9 3B
60F8: 00 9D 00 7D 9D 20 7D 9D FE
6100: 40 7D 9D 60 7D 9D 00 7F DD
6108: A9 FF 9D C0 7E CA 10 E7 86
6110: A9 13 8D 20 7D 8D E0 7D 81
6118: 8D 60 7D 8D 20 7E 0A 0A 5B
6120: 8D B6 76 AD 60 7D 8D 63 78
6128: 7D 8D 23 7E AD 20 7D 8D CF
6130: 23 7D 8D E3 7D A9 00 8D F3
6138: 69 6D 20 FE 6B A9 02 8D 92
6140: E3 7E A9 00 8D 03 7D 8D CA
6148: C3 7D A9 78 8D C3 7E A9 2B
6150: F2 8D A3 7D A9 F3 8D 83 F7
6158: 7D A9 04 8D C2 61 A9 01 8D
6160: 8D C3 61 60 AD 71 61 0A 0D
6168: 0A 38 6D 71 61 8D 71 61 88
6170: 60 00 A2 03 8E 77 6D BD D2
6178: C0 7E C9 FF F0 06 20 1A 6E
6180: 66 20 C4 61 AE 77 6D E8 44
6188: EC C2 61 90 E7 A2 03 8E 06
6190: 77 6D BD C0 7E 30 17 20 31
6198: 1F 62 AE 77 6D 20 66 63 EC
61A0: AE 77 6D BD C0 7E 30 06 88
61A8: 20 08 63 4C B8 61 BD C0 36
61B0: 7E C9 FF F0 03 FE C0 7E 48
61B8: AE 77 6D E8 EC C2 61 90 B2
61C0: CE 60 04 01 BD 40 7E 8D 0D
61C8: 78 6D BD 80 7E 8D 6D 6D 55
61D0: BD A0 7E 8D 6E 6D BD 60 48
61D8: 7E AA 20 CE 68 BD FE 65 14
61E0: 31 EC 91 EC BD 05 66 31 78
61E8: EE 91 EE 20 A4 65 BD 0C A9
61F0: 66 31 EC 91 EC BD 13 66 D4
61F8: 31 EE 91 EE 20 A4 65 BD 4D
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6208: 66 31 EE 91 EE 20 A4 65 E9
6210: BD FE 65 31 EC 91 EC BD 78
6218: 05 66 31 EE 91 EE 60 BD D4
6220: C0 7E F0 59 20 64 61 C9 B7
6228: 40 B0 03 DE C0 7E AD 20 03
6230: 7D 9D 20 7D DE 20 7D A9 13
6238: 00 8D 80 6D A9 FF 9D 00 CF
6240: 7D BD E0 7E 4A 6E 80 6D B1
6248: 4A 6E 80 6D 8D 81 6D AD AF
6250: 40 7D 18 6D 80 6D 9D 40 A3
6258: 7D AD 60 7D 6D 81 6D 9D 15
6260: 60 7D F0 05 C9 27 B0 0A 79
6268: 60 A9 01 9D 60 7D 9D 40 36
6270: 7D 60 A9 26 9D 60 7D A9 B6
6278: EA 9D 40 7D 60 BD 20 7D B1
6280: CD 20 7D D0 06 20 4B 66 9E
6288: AE 77 6D A9 00 8D 73 6D 55
6290: BD 00 7D 18 7D A0 7D 9D 6C
6298: 00 7D 08 BD A0 7D 30 42 37
62A0: 28 90 53 FE 20 7D EE 73 40
62A8: 6D BD 20 7D CD 20 7D 90 E9
62B0: 45 D0 06 20 4B 66 4C F6 92
62B8: 62 A9 FC 9D C0 7E 20 C4 97
62C0: 61 CE C3 61 F0 03 30 01 6D
62C8: 60 CE 6D 06 20 FC 75 AD 0D
62D0: 6D 06 C9 B1 90 06 A9 6F 81
62D8: 8D 8A 6D 60 A9 00 8D 8A AD
62E0: 6D 60 28 B0 11 DE 20 7D 46
62E8: D0 0C 20 D0 60 BD A0 7D E2
62F0: 20 1C 76 9D A0 7D 20 8C 3D
62F8: 60 AD 72 6D F0 09 BD 80 26
6300: 7D 20 1C 76 9D 80 7D 60 C2
6308: AE 77 6D BD 00 7D 8D 78 17
6310: 6D BD 40 7D 8D 6D 6D BD 97
6318: 60 7D 8D 6E 6D BD 20 7D 27
6320: AA 20 CE 68 BD E2 65 11 F9
6328: EC 91 EC BD E9 65 11 EE 39
6330: 91 EE 20 A4 65 BD F0 65 33
6338: 11 EC 91 EC BD F7 65 11 6D
6340: EE 91 EE 20 A4 65 BD F0 E9
6348: 65 11 EC 91 EC BD F7 65 70
6350: 11 EE 91 EE 20 A4 65 BD 98
6358: E2 65 11 EC 91 EC BD E9 80
6360: 65 11 EE 91 EE 60 BD 60 E9
6368: 7D 8D 6B 6D CE 6B 6D 4E E2
6370: 6B 6D B0 04 18 4C 79 63 E6
6378: 38 BD 40 7D 6A 8D 6C 6D 7A
6380: BD 20 7D 8D B5 76 BD 20 D9
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6390: 76 BD A0 7D 10 50 A0 00 F0
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63A0: BD 80 7D 30 22 A0 01 20 CE
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63B0: 02 20 56 64 D0 7F A0 07 5E
63B8: 20 56 64 D0 78 A0 03 20 2B
63C0: 56 64 D0 71 4C 2D 64 A0 7D
63C8: 07 20 56 64 D0 67 A0 06 97
63D0: 20 56 64 D0 60 A0 05 20 86
63D8: 56 64 D0 59 A0 01 20 56 33
63E0: 64 D0 52 4C 2D 64 A0 04 5D
63E8: 20 56 64 D0 48 BD 80 7D A6
63F0: 30 1F A0 03 20 56 64 D0 CF
63F8: 3C A0 02 20 56 64 D0 35 63
6400: A0 01 20 56 64 D0 2E A0 26
6408: 05 20 56 64 D0 27 4C 2D 55
6410: 64 A0 05 20 56 64 D0 1D D8
6418: A0 06 20 56 64 D0 16 A0 4F
6420: 03 20 56 64 D0 0F A0 07 8E
6428: 20 56 64 D0 08 AE 77 6D 87
6430: A9 00 9D 00 7F 60 25 4B 94
6438: 4B 4B 25 00 00 00 00 00 1E
6440: 41 81 81 81 41 00 00 01 5D
6448: 01 01 00 01 01 01 01 01 F0
6450: 00 01 01 01 00 01 B9 36 37
6458: 64 18 6D 6C 6D 8D D4 64 7D
6460: AD 6B 6D 69 00 8D 40 7F 55
6468: B9 3E 64 18 AE 77 6D 7D 57
6470: 00 7D 8D D5 64 AD B5 76 63
6478: 69 00 8D 41 7F 8C 8C 6D 70
6480: 20 D7 64 F0 35 AE 67 6D 8B
6488: E0 04 F0 29 2C 30 C0 AE C5
6490: 77 6D BD A0 7D 20 1C 76 4D
6498: 9D A0 7D BD A0 7D 30 0C 4B
64A0: 18 6D D5 64 B0 0F 20 BB 8F
64A8: 64 4C B5 64 18 6D D5 64 3A
64B0: 90 03 20 BB 64 2C 30 C0 37
64B8: A9 01 60 AE 77 6D BD 80 FA
64C0: 7D 20 1C 76 9D 80 7D AE D3
64C8: 77 6D BD A0 7D 20 1C 76 85
64D0: 9D A0 7D 60 00 00 60 AD B4
64D8: 41 7F F0 FA C9 0D B0 F6 CA
64E0: 20 6D 60 B9 00 7C F0 EE 7F
64E8: AE 67 6D E0 04 F0 3A C9 C0
64F0: 01 F0 36 C9 08 D0 21 AE 4E
64F8: 77 6D FE 00 7F BD 00 7F 2B
6500: C9 10 D0 3D A9 00 9D 00 2A
6508: 7F 20 42 6D 9D 80 7D 20 C3
6510: 42 6D 9D A0 7D 4C 41 65 1A
6518: 38 E9 01 99 00 7C 2C 30 AD
6520: C0 A9 01 20 CC 75 4C 41 ED
6528: 65 C9 08 F0 0A CE D3 6E C9
6530: D0 05 A9 01 8D 8A 6D A9 05
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6538: ØØ 99 ØØ 7C A9 Ø5 2Ø CC 9F
6540: 75 2Ø 4D 65 AE 77 6D 2Ø 1C
6548: DØ 6Ø A9 Ø1 6Ø A9 Ø1 8D 12
6550: 7B 6D 2Ø 87 65 EE 4Ø 7F 97
6558: A9 ØØ 8D 7B 6D 2Ø 87 65 C1
6560: EE 41 7F 2Ø 87 65 CE 4Ø 94
6568: 7F 2Ø 87 65 CE 4Ø 7F 2Ø D8
6570: 87 65 CE 41 7F 2Ø 87 65 37
6578: CE 41 7F 2Ø 87 65 CE 4Ø 9C
6580: 7F 2Ø 87 65 CE 4Ø 7F AD 7E
6588: 41 7F C9 ØD BØ 15 AD 4Ø 53
6590: 7F C9 13 BØ ØE 2Ø 6D 6Ø 27
6598: B9 ØØ 7C ØD 7B 6D FØ Ø3 17
65A0: 4C 87 69 6Ø EE 6F 6D AD 64
65A8: 6F 6D C9 Ø8 FØ ØA A5 ED 29
65B0: 18 69 Ø4 85 ED 4C C7 65 5Ø
65B8: A9 ØØ 8D 78 6D AE 7Ø 6D Ø6
65C0: E8 8E 7Ø 6D 2Ø CE 68 A5 3B
65C8: EC 18 69 Ø1 85 EE A5 ED 6E
65D0: C9 6Ø BØ Ø5 69 ØØ 85 EF 45
65D8: 6Ø A9 ØØ 8D 54 C0 8D 51 29
65E0: C0 ØØ Ø6 ØC 18 3Ø 6Ø 4Ø 1Ø
65E8: ØØ ØØ ØØ ØØ ØØ ØØ Ø1 Ø3 B8
65F0: ØF 1E 3C 78 7Ø 6Ø 4Ø ØØ 5F
65F8: ØØ ØØ ØØ Ø1 Ø3 Ø7 F9 F3 EF
6600: E7 CF 9F BF FF FF FF FF A4
6608: FF FF FE FC FØ E1 C3 87 A2
6610: 8F 9F BF FF FF FF FF FE 83
6618: FC F8 BD C0 7D 9D 4Ø 7E C6
6620: BD E0 7D 9D 6Ø 7E BD ØØ Ø6
6628: 7E 9D 8Ø 7E BD 2Ø 7E 9D 9C
6630: A0 7E BD ØØ 7D 9D C0 7D Ø6
6638: BD 2Ø 7D 9D E0 7D BD 4Ø 2E
6640: 7D 9D ØØ 7E BD 6Ø 7D 9D 23
6648: 2Ø 7E 6Ø AE 77 6D BD 4Ø E8
6650: 7D 69 49 48 BD 6Ø 7D 69 B7
6658: ØØ 8D 7C 6D 68 ØA 2E 7C 33
6660: 6D ØA 2E 7C 6D AD 7C 6D 7C
6668: 8D 74 6D CD AD 76 BØ Ø3 4F
6670: 4C FD 66 AD 74 6D CD B3 33
6678: 76 9Ø Ø3 4C FD 66 AD 74 23
6680: 6D 38 ED AD 76 AE 77 6D 75
6688: AC 67 6D C0 Ø2 DØ Ø8 9D 4Ø
6690: E0 7E A9 5Ø 9D C0 7E BD 52
6698: 8Ø 7D 2Ø 1A 76 9D 8Ø 7D 53
66A0: BD A0 7D 2Ø 1A 76 2Ø 1C 2D
66A8: 76 9D A0 7D 2C 3Ø C0 2C D3
66B0: 3Ø C0 AD 74 6D CD BØ 76 3D
66B8: BØ Ø9 BD 8Ø 7D 2Ø 1C 76 FA
66C0: 9D 8Ø 7D A0 Ø5 AD 74 6D 6B
66C8: D9 AD 76 BØ Ø3 88 DØ F8 9C
66D0: BD 8Ø 7D 18 79 1C 67 CD A6
66D8: 22 67 9Ø Ø7 CD 23 67 BØ 8D
66E0: Ø2 9Ø Ø3 9D 8Ø 7D BD A0 23
66E8: 7D 18 79 16 67 CD 22 67 29
66F0: 9Ø Ø5 CD 23 67 9Ø Ø3 9D 54
66F8: A0 7D A9 ØØ 6Ø AC 67 6D 9C
6700: C0 Ø8 DØ 11 AE 77 6D BD 48
6708: A0 7D 2Ø 1A 76 2Ø 1C 76 ØF
6710: 9D A0 7D A9 Ø1 6Ø Ø1 ØØ AB
6718: FF FF ØØ Ø1 FF ØØ Ø1 FF F8
6720: ØØ Ø1 6Ø A0 BD 6Ø 7D 8D 3D
6728: 7C 6D BD 4Ø 7D ØA 2E 7C 39
6730: 6D ØA 2E 7C 6D AD 7C 6D 4E
6738: 6Ø AD ØC 69 C9 4Ø A9 ØØ 5D
6740: 2A AA BD 54 C0 AD ØC 69 ØA
6748: 49 6Ø 8D ØC 69 6Ø A2 ØØ 58
6750: 2Ø 1A 66 A2 ØØ 8E B4 76 C6
6758: 8E 78 6D AC 67 6D C0 ØC 83
6760: DØ 15 AD A5 6C 3Ø 1Ø A9 DA
6768: Ø3 38 ED C3 61 FØ Ø8 3Ø CF
6770: Ø6 2Ø AE 6C CE A5 6C AD 7A
6778: 7F 74 C9 DØ FØ ØF 2Ø 64 D2
6780: 61 29 Ø3 DØ Ø3 2Ø 69 72 95
6788: 4C 8F 6D Ø1 Ø1 2Ø 69 72 EC
6790: AD 7Ø C0 A2 ØØ A0 ØØ 48 5F
6798: 68 24 ØØ AD 64 C0 1Ø ØC D1
67A0: C8 AD 65 C0 3Ø Ø2 1Ø F1 93
67A8: E8 4C 9B 67 24 ØØ AD 65 CA
67B0: C0 3Ø F5 8C 78 6D C8 EA 69
67B8: DØ FC AC 78 6D AD C0 FB EB
67C0: C9 E0 DØ 2C 4E 78 6D 4E Ø7
67C8: 78 6D AD 8B 67 49 Ø1 8D 8D
67D0: 8B 67 FØ Ø9 AD 78 6D 8D A5
67D8: 8C 67 4C 3Ø 68 AD 78 6D AC
67E0: CD 8C 67 FØ ØB 8D 8C 67 C4
67E8: A9 Ø1 8D 8B 67 4C F3 67 F2
67F0: 8C B6 76 AD 61 C0 1Ø Ø3 8E
67F8: EE B4 76 AD B6 76 C9 A0 D9
6800: 9Ø Ø2 A9 9F 4A 4A 8D 6Ø BF
6808: 7D AD B6 76 8D B7 76 29 A2
6810: 3F ØA ØA 8D 4Ø 7D AD B4 25
6818: 76 FØ 12 A2 Ø3 BD C0 7E DB
6820: 3Ø Ø5 A9 ØØ 9D C0 7E E8 55
6828: EC C2 61 9Ø FØ 4C 3Ø 68 D6
6830: AC 67 6D C0 Ø8 DØ Ø3 2Ø 94
6838: 62 6C AD ØD 69 8D ØE 69 E2
6840: AE 2Ø 7D 2Ø 8A 73 A9 ØØ 97
6848: AC A0 7E C0 28 B0 Ø9 2Ø A9
6850: C9 73 C8 CE ØE 69 1Ø F3 13
6858: AD ØD 69 8D ØE 69 CE ØE ØB
6860: 69 A9 FF AC 6Ø 7D C8 C0 66
6868: 28 BØ Ø9 2Ø C9 73 C8 CE 19
6870: ØE 69 1Ø F3 88 AD 4Ø 7D DC
6878: 4A 4A AA BD 1E 69 AA BD DB
6880: 17 69 2Ø C9 73 AC 6Ø 7D 64
6888: BD 1Ø 69 2Ø C9 73 AD 6Ø 43
6890: 7D 8D AD 76 AD 4Ø 7D ØA 14
6898: 2E AD 76 ØA 2E AD 76 AD 1E
68A0: ØD 69 4A 8D 78 6D 18 6D 8B
68A8: AD 76 8D AE 76 6D ØD 69 77
68B0: 8D AF 76 6D 78 6D 38 8D 51
68B8: BØ 76 6D 78 6D 8D B1 76 3Ø
68C0: 6D ØD 69 8D B2 76 38 6D DE
68C8: 78 6D 8D B3 76 6Ø BD 49 18
68D0: 6A 18 6D ØC 69 85 ED BD 46
68D8: 61 6A 85 EC 8E 7Ø 6D AD 33
68E0: 78 6D 4A 4A 4A 4A 4A 8D D4
68E8: 6F 6D ØA ØA 18 65 ED 85 66
68F0: ED A5 EC 18 69 Ø1 85 EE 8A
68F8: A5 ED 69 ØØ 85 EF AD 6D F9
6900: 6D 4A 4A AA BD 1E 69 AA F3
6908: AC 6E 6D 6Ø 2Ø Ø4 ØØ Ø8 99
6910: 7F 7E 7C 78 7Ø 6Ø 4Ø Ø1 DF
6918: Ø3 Ø7 ØF 1F 3F 7F ØØ ØØ F9
6920: ØØ ØØ ØØ ØØ ØØ ØØ ØØ Ø1 F3
6928: Ø1 Ø1 Ø1 Ø1 Ø1 Ø1 Ø1 Ø1 FA
6930: Ø2 Ø2 Ø2 Ø2 Ø2 Ø2 Ø2 Ø2 Ø3
6938: Ø2 Ø3 Ø3 Ø3 Ø3 Ø3 Ø3 Ø3 8A
6940: Ø3 Ø3 Ø3 Ø4 Ø4 Ø4 Ø4 Ø4 32
6948: Ø4 Ø4 Ø4 Ø4 Ø5 Ø5 Ø5 Ø5 2A
6950: Ø5 Ø5 Ø5 Ø5 Ø5 Ø6 Ø6 Ø6 2A
6958: Ø6 Ø6 Ø6 Ø6 Ø6 Ø6 A9 Ø1 6D
6960: 8D 41 7F A9 ØA 8D C6 72 5B
6968: A9 ØØ 8D 4Ø 7F AD 41 7F 7A
6970: C9 ØD BØ 12 2Ø 87 69 EE 83
6978: 4Ø 7F AD 4Ø 7F C9 13 9Ø DE
6980: F3 EE 41 7F DØ E2 6Ø A0 9C
6988: ØØ A9 Ø7 8D 79 6D AE 41 9F
6990: 7F E8 2Ø 32 6A 2Ø 6D 6Ø 93
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6998: B9 ØØ 7C AA DØ Ø6 EE 79 78
69A0: 6D 4C EE 69 AD 1C 6A 3D A1
69A8: 11 6A 8D 8D 6D BD 11 6A 18
69B0: C9 FF FØ Ø2 49 FF 2D 1F 6A
69B8: 6A 8D 8E 6D AD 4Ø 7F ØA 44
69C0: A8 C8 AD 8D 6D 91 EC 91 C5
69C8: EE C8 AD 8E 6D 91 EC 91 Ø1
69D0: EE 88 2Ø 22 6A 2Ø 2A 6A F5
69D8: CE 79 6D DØ E5 AD 1A 6A BØ
69E0: 91 EC 91 EE C8 AD 1D 6A 7A
69E8: 91 EC 91 EE 88 6Ø AD 4Ø 42
69F0: 7F ØA A8 C8 A9 Ø8 8D 79 A9
69F8: 6D A9 ØØ 91 EC 91 EE C8 5A
6A00: 91 EC 91 EE 88 2Ø 22 6A 6D
6A08: 2Ø 2A 6A CE 79 6D DØ E9 BE
6A10: 6Ø ØØ FF AA AA AA AA AA BF
6A18: AA 4B D5 ØØ 7F AA ØØ 3F B5
6A20: Ø4 ØØ A5 EF 18 69 Ø4 85 9E
6A28: EF 6Ø A5 ED 18 69 Ø4 85 94
6A30: ED 6Ø BD 49 6A 18 6D ØC FA
6A38: 69 85 ED 4D 48 6A 85 EF 9C
6A40: BD 61 6A 85 EC 85 EE 6Ø AD
6A48: 6Ø ØØ ØØ Ø1 Ø1 Ø2 Ø2 Ø3 74
6A50: Ø3 ØØ ØØ Ø1 Ø1 Ø2 Ø2 Ø3 CD
6A58: Ø3 ØØ ØØ Ø1 Ø1 Ø2 Ø2 Ø3 D5
6A60: Ø3 ØØ 8Ø ØØ 8Ø ØØ 8Ø ØØ CB
6A68: 8Ø 28 A8 28 A8 28 A8 28 7E
6A70: A8 5Ø DØ 5Ø DØ 5Ø DØ 5Ø 86
6A78: DØ AD C1 7E C9 Ø1 DØ Ø3 38
6A80: 4C 47 6B C9 ØØ FØ Ø6 EE 16
6A88: C1 7E 4C 8C 6B CE 66 6D Ø1
6A90: DØ 5D A9 DE 8D 66 6D 2Ø 49
6A98: 64 61 C9 17 BØ 51 2Ø 64 12
6AA0: 61 29 ØF 18 ØA 18 69 Ø3 5A
6AA8: 8D 61 7D A9 Ø1 8D 21 7D E4
6AB0: 8D E1 7D 8D Ø1 7D 8D C1 28
6AB8: 7D A9 Ø8 8D A1 7D A9 Ø1 E7
6AC0: 8D C1 7E 8D 66 6D 2Ø 64 Ø3
6AC8: 61 29 ØF AA 8E 6A 6D BD DB
6AD0: ØØ 6B FØ F2 BD FØ 6A CD 22
6AD8: 69 6D DØ ØA E8 EØ 1Ø DØ 34
6AE0: F3 A2 ØØ 4C D4 6A 8D 69 F1
6AE8: 6D AD 69 6D 4C 29 76 6Ø 38
6AF0: Ø2 Ø4 Ø6 Ø8 ØA ØC ØE Ø2 A7
6AF8: Ø4 Ø6 Ø8 ØA ØC ØE 12 1Ø BF
6B00: 8Ø 8Ø 8Ø 8Ø 8Ø 8Ø 8Ø Ø2 58
6B08: Ø2 Ø2 Ø2 Ø2 Ø2 Ø2 Ø2 Ø2 DE
6B10: A9 ØØ 8D 48 6A AD 21 7D BB
6B18: 8D 41 7F CE 41 7F AD 61 A7
6B20: 7D 8D 4Ø 7F CE 4Ø 7F 4E DD
6B28: 4Ø 7F AD 41 7F C9 ØD BØ B6
6B30: Ø3 2Ø 87 69 CE 41 7F AD 4Ø
6B38: 41 7F C9 ØD BØ Ø3 2Ø 87 F2
6B40: 69 A9 6Ø 8D 48 6A 6Ø 2Ø E7
6B48: 1Ø 6B AD Ø1 7D 18 6D A1 9Ø
6B50: 7D 8D Ø1 7D AD 21 7D 69 97
6B58: ØØ 8D 21 7D CD 2Ø 7D 9Ø Ø9
6B60: 59 DØ 1E AC 67 6D CØ Ø8 21
6B68: FØ ØE AD 61 7D 38 ED 6Ø 1Ø
6B70: 7D CD ØD 69 FØ Ø2 BØ 42 E4
6B78: AD 69 6D 8D 67 6D 2Ø FE 37
6B80: 6B A9 F1 8D C1 7E A9 FA E4
6B88: 8D 66 6D 6Ø AE 21 7D 8E F6
6B90: 7Ø 6D AD Ø1 7D 8D 78 6D 41
6B98: 2Ø CE 68 AC 61 7D FØ 19 Ø7
6BA0: 8C 6E 6D A9 Ø7 8D 84 6D 86
6BA8: A9 ØØ 91 EC 91 EE 2Ø A4 82
6BB0: 65 CE 84 6D DØ F2 2Ø 1Ø F7
6BB8: 6B 6Ø AE 21 7D 8E 7Ø 6D B9
6BC0: AD Ø1 7D 8D 78 6D 2Ø CE BF
6BC8: 68 AC 61 7D 8C 6E 6D A9 A5
6BD0: ØØ 91 EC 91 EE 2Ø A4 65 69
6BD8: A9 ØØ 91 EC 91 EE A2 ØØ 13
6BE0: 8E 83 6D BD 2Ø 7F Ø9 AA 25
6BE8: 91 EC BD 21 7F Ø9 D5 91 EA
6BF0: EE 2Ø A4 65 AE 83 6D E8 79
6BF8: E8 EØ ØA 9Ø E3 6Ø AD ØF D1
6C00: 69 4A 8D ØD 69 A9 ØØ 8D 22
6C08: C1 7E AD 69 6D 8D 67 6D 8B
6C10: 2Ø AD 73 AE 6A 6D BD ØØ 42
6C18: 6B FØ Ø5 3Ø Ø3 DE ØØ 6B 85
6C20: AC 67 6D B9 33 6C 8D 3Ø Ø9
6C28: 6C B9 34 6C 8D 31 6C 4C 49
6C30: 32 6C 6Ø 32 6C 32 6C 32 A3
6C38: 6C 4D 6C 62 6C 73 6C A6 FE
6C40: 6C AC 6C 9F 6C 54 6C 32 C1
6C48: 6C 32 6C 32 6C AD ØF 69 36
6C50: 8D ØD 69 6Ø AD 6D Ø6 C9 5F
6C58: B9 FØ Ø6 EE 6D Ø6 4C FC 13
6C60: 75 6Ø AE 2Ø 7D 2Ø 8A 73 D8
6C68: AØ 27 A9 7F 2Ø C9 73 88 2Ø
6C70: 1Ø FA 6Ø A2 Ø3 BD CØ 7E 55
6C78: 3Ø 1E BD 8Ø 7D 2Ø E2 72 55
6C80: 2Ø E2 72 2Ø E2 72 9D 8Ø ØF
6C88: 7D BD AØ 7D 2Ø E2 72 2Ø ØD
6C90: E2 72 2Ø E2 72 9D AØ 7D 72
6C98: E8 EC C2 61 9Ø D7 6Ø A9 DD
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6CA8: 8D A5 6C 6Ø A9 1C 8D 85 A3
6CB0: 6D 8D 8Ø 6D A2 Ø3 BD CØ E7
6CB8: 7E 1Ø Ø6 E8 EØ 2Ø 9Ø F6 C3
6CC0: 6Ø 8E 77 6D AØ Ø3 B9 CØ 78
6CC8: 7E C9 FF DØ 5D CC C2 61 65
6CD0: 9Ø Ø6 8C C2 61 EE C2 61 DE
6CD8: EE C3 61 A9 ØØ 99 CØ 7E 47
6CE0: BD 2Ø 7D 99 2Ø 7D 99 EØ F4
6CE8: 7D BD 6Ø 7D 99 6Ø 7D 99 B6
6CF0: 2Ø 7E BD ØØ 7D 99 ØØ 7D Ø1
6CF8: 99 CØ 7D BD 4Ø 7D 99 4Ø C5
6D00: 7D 99 ØØ 7E BD 8Ø 7D 2Ø F2
6D08: 1A 76 38 6D 8Ø 6D 69 1Ø Ø8
6D10: 8D 86 6D 2Ø 1C 76 8D 87 6Ø
6D18: 6D 2Ø 42 6D 99 8Ø 7D 2Ø BA
6D20: 42 6D 99 AØ 7D CE 85 6D 54
6D28: FØ Ø5 C8 CØ 2Ø 9Ø 97 2Ø 74
6D30: 42 6D 9D 8Ø 7D 2Ø 42 6D A1
6D38: 2Ø 1A 76 2Ø 1C 76 9D AØ 11
6D40: 7D 6Ø 2Ø 64 61 C9 1Ø 9Ø 1F
6D48: F9 C9 FØ BØ F5 CD 22 67 4E
6D50: 9Ø Ø7 CD 23 67 BØ Ø2 9Ø B3
6D58: E9 CD 86 6D 9Ø Ø7 CD 87 Ø7
6D60: 6D BØ Ø2 9Ø DD 6Ø ØØ ØØ D7
6D68: ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ 43
6D70: ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ 4B
6D78: ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ 53
6D80: ØØ ØØ ØØ ØØ ØØ ØØ ØØ ØØ 5B
6D88: ØØ ØØ ØØ ØØ ØØ ØØ ØØ AD 11
6D90: ØØ CØ 2C 1Ø CØ 3Ø Ø2 29 16
6D98: ØØ Ø9 8Ø A2 ØØ 8E 1Ø CØ ØB
6DA0: C9 CB FØ 29 C9 EB FØ 25 Ø9
6DA8: C9 CA FØ 3C C9 EA FØ 38 11
6DB0: C9 CC FØ 39 C9 EC FØ 35 6E
6DB8: C9 BB FØ 4E AØ 85 C8 DØ E7
6DC0: FD C9 AØ FØ 6A A9 ØØ 8D B7
6DC8: 8Ø 7D 4C 16 68 A9 E5 18 FB
6DD0: 6D 4Ø 7D 8D 4Ø 7D BØ ØD 61
6DD8: CE 6Ø 7D 1Ø Ø8 A9 ØØ 8D 58
6DE0: 4Ø 7D 8D 6Ø 7D 4C ØF 6E 9C
6DE8: A9 AF 4C CF 6D A9 1B 18 6B
6DF0: 6D 4Ø 7D 8D 4Ø 7D 9Ø ØF 43
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6DF8: EE 60 7D AD 60 7D C9 27 A1
6E00: 90 05 A9 26 8D 60 7D 4C 33
6E08: 0F 6E A9 51 4C EF 6D A2 F1
6E10: 00 20 24 67 8D B6 76 C9 ED
6E18: 9F 90 06 C9 E6 B0 08 A9 F9
6E20: 9F 8D B6 76 4C 16 68 A9 A3
6E28: 00 8D B6 76 4C 16 68 EE 21
6E30: B4 76 4C 16 68 A9 00 8D 67
6E38: 10 C0 AD 00 C0 C9 A0 D0 42
6E40: F9 A9 00 8D 10 C0 60 AD 4F
6E48: 0C 60 D0 4C AD 42 7F 29 C0
6E50: 07 0A A8 B9 D4 6E 85 E6 36
6E58: B9 D5 6E 85 E7 A0 00 A2 12
6E60: 00 8E D3 6E B1 E6 F0 25 72
6E68: 8D CF 6E C8 F0 1F B1 E6 A8
6E70: 8D D0 6E AD D0 6E F0 07 1A
6E78: C9 08 F0 03 EE D3 6E 9D CB
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76A0: 00 50 02 50 02 10 02 50 8B
76A8: 02 10 00 10 00 00 00 00 9B
76B0: 00 00 00 00 00 00 00 4F EC
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New Products

Play 18 with the Golden Bear

Computer golfers can now tee it up with the Player of the Century, Jack Nicklaus. Accolade's *Jack Nicklaus' Greatest 18 Holes of Major Championship Golf*, based on the recently released videotape from the ABC Sports Video library, features Nicklaus' favorite 18 holes of major championship golf along with two additional Nicklaus-designed courses.

Players can compete against as many as three human opponents, including a computerized Jack Nicklaus and a variety of computerized men and women. Other features include a choice of Skins scoring or stroke play; pro, men's, or ladies' tees; wind intensity and direction; and uphill or downhill lies.

Jack Nicklaus' Greatest 18 Holes of Major Championship Golf is the first joint project produced as the result of a three-year agreement between Jack Nicklaus Productions and Accolade. Nicklaus, recently named by *Golf Magazine* as the best player in America's first 100 years of golf, plans to work with Accolade on additional home-computer golf simulations.

Available for the Apple IIGS, the game has a suggested retail price of $49.95.

Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128

Circle Reader Service Number 170.

Database Detectives

Students in grades 4 and up can learn how to search a database, practice logical thinking, and develop analytical and organizational skills with *Solve It!*, from Sunburst.

Players assume the role of detective and must read a case history, keeping in mind the names of people, places, and things that they think warrant further investigation. The student must then enter these names into the database, which will provide clues in the form of *and/or/not* logic statements. Working with these clues, students eliminate suspects until the mystery is solved.

The program's six mysteries contain clues, suspects, and solutions that change randomly. Each mystery can also be played at three different difficulty levels.

At the Rookie Detectives level, all clues reveal information vital to solving the case. Senior Detectives must distinguish between important and unimportant clues, while Super Sleuths must find out whether a clue is important according to related information that must also be uncovered.

The Teacher Option menu allows teachers to select mysteries and preset the level of difficulty. The Teacher's Guide provides ready-made activities designed to help teachers introduce students to databases and logical thinking.

The complete package includes the program disk, a mystery disk, backup disks, and the Teacher's Guide. The suggested retail price is $75.00.

Sunburst Communications, 39 Washington Ave., Pleasantville, NY 10570

Circle Reader Service Number 171.

Keyboarding

Martek Electronics has made available an IBM-style keyboard for the Apple II+ and IIe.

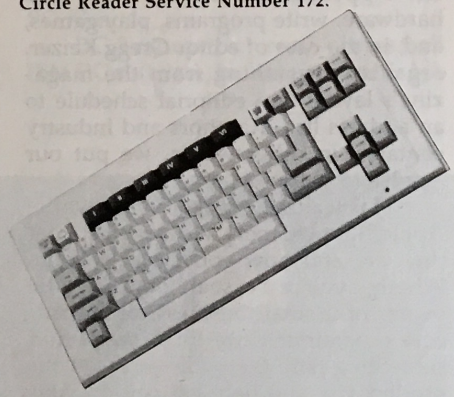
The keyboard features a low-profile, detached case and a four-foot coil cord. Features include one-keystroke command entries, 12 user-programmable keys, logical cursor-pad layout, tactile feedback, and plug-in installation. Apple II+ owners receive all ASCII codes, autorepeat, both apple keys, and reprogrammable up and down arrows. The IIe version also supports a numeric keypad.

The unit consists of the keyboard, with an internal MPU, and the Martek interface card, which contains another MPU to convert the keyboard's serial output to the proper outputs to plug into the keyboard connector. It does not use a slot. Apple IIe owners need to note which keyboard encoder IC they have before ordering.

The Apple II+ keyboard kit has a suggested retail price of $59.00, while the assembled unit sells for $79.00. The IIe keyboard retails for $69.00 for the kit and $89.00 for the assembled unit. A II+ to IIe keyboard-conversion kit sells for $20.00.

Martek Electronics, P.O. Box 24, Novi, MI 48050

Circle Reader Service Number 172.



Martek has offered an IBM-style keyboard for the Apple II+ and IIe.

IIc Plus GEOS

Berkeley Softworks has unveiled GEOS integrated productivity software for the Apple IIc Plus, Apple Computer's newest entry-level machine.

The graphically oriented GEOS for the Apple IIc Plus utilizes the larger storage capacity of a 3½-inch disk and includes *geoMouse*, which eliminates complicated keyboard commands. The fully integrated GEOS is ProDOS-compatible and has Macintosh-like capabilities.

In addition to the operating system, the GEOS disk for the IIc Plus includes *geoWrite*, a WYSIWYG word processor with multiple fonts; *geoPaint*, a graphics editor; *geoSpell*, a spelling checker and a 38,000-word dictionary; *geoMerge*, a mail-merge program; *TextGrabber*, a conversion utility for accessing other word processing programs like *AppleWorks; Graphics Grabber*, a program for importing clip art from graphics programs; *geoLaser*, an Apple LaserWriter printer driver; and a set of pop-up desk accessories including a calculator, a notepad, an alarm clock, a photo manager, and a text manager.

Like GEOS for other Apple II–series computers, the IIc Plus version allows users to switch from one application to another with a point-and-click command. With the enhanced file-management function, files can be deleted, moved, or renamed. Graphics can also be imported into text and vice versa.

The suggested retail price for Apple IIc Plus GEOS is $199.95.

Berkeley Softworks, 2150 Shattuck Ave., Berkeley, CA 94704

Circle Reader Service Number 173.

More for the IIc Plus

Brøderbund recently announced that it is releasing seven of its most popular titles for the new Apple IIc Plus.

The initial release is *On Balance*, a personal money-management program. It has a suggested retail price of $59.95. *The Print Shop*, which allows users to create their own personal letterhead, greeting cards, signs, and banners, is available for the IIc Plus and sells for $49.95. The geography adventure *Where in Europe Is Carmen Sandiego?* has also been released in the new format and retails for $44.95.

Other available titles include the *Bank Street Writer Plus* word processor, for $79.95; the *Ancient Art of War at Sea* action/strategy game, for $44.95; and *Dazzle Draw*, a graphics illustration program, which sells for $59.95. *VCR Companion*, one of Brøderbund's newest titles, is also available for the IIc Plus and offers more than 120 fonts and graphics for creating titles, credits, introductions, intermissions, and special effects for videotapes. It has a suggested retail price of $49.95.

Brøderbund Software, 17 Paul Dr., San Rafael, CA 94903-2101

Circle Reader Service Number 174. aa

BECOMING A POWER USER

Put your Apple into high gear with these high- powered hardware and software products.

In a world of 16- and 32-bit microprocessors, specialized video chips, and megabytes of memory, the venerable 8-bit Apple II remains a popular and useful computer. You see, it's what a computer does, not what it *can* do, that makes it such a powerful tool. And as we all know, the Apple II can do plenty.

To make your Apple perform, you need quality software and capable peripherals. Becoming a power user doesn't mean shelling out $3,000 to buy a Macintosh or mortgaging your house so you can lease some time on a Cray supercomputer; it means finding the right tools and learning to use them.

Here at COMPUTE!, we deal with Apple computers on a daily basis. We use Apples to review software and hardware, write programs, play games, and, in the case of editor Gregg Keizer, organize everything from the magazine's layout and editorial schedule to an address list of authors and industry contacts. In other words, we put our Apples to work.

This feature lists six of our favorite Apple II power tools. We describe what they are and how you can use them. Whether you're a casual home user, the owner of a small business, or a hardcore programmer, we think you'll find something here that will increase your productivity and help get you on your way to becoming a *power user.*

Power Processing

The Zip Chip

Zip Technology's Zip Chip is finally shipping, and it easily lives up to all its claims. A speed-up card on a chip, it's a replacement for the 6502 or 65C02 microprocessor that's at the heart of the Apple II+, IIe, and IIc. It's rated at 4 MHz—4 times faster than a standard Apple II and about 1½ times faster than the IIGS in Fast mode.

Speed-up cards have been available for some time, but they all suffer from a number of drawbacks. They can't be used with a IIc, they generate a lot of excess heat, and they can't be used with more than 128K of memory (unless you add more fast memory to the accelerator card). The Zip Chip solves all of these problems. It works with the II+, IIe, *and* IIc; allows access to as much as two megabytes of memory; and is relatively inexpensive. (The Apple IIc Plus has its own multispeed microprocessor, so the Zip Chip is unnecessary if you own this machine.)

The Zip Chip package contains a sparse but usable manual, the chip, a chip-removal tool, a utilities disk, and a lifetime warranty. Installing the chip is not for the faint of heart, since you must

remove your computer's microprocessor. You can damage the chip if you're not careful, so you may want a trained technician to perform the operation. But the installation instructions in the manual are detailed and clear; I had little trouble installing the chip in my IIc.

Once installed, the Zip Chip speeds up your internal memory, the speaker, and slots 1, 3, and 4. The other slots are left alone because most Apple disk drives must operate at normal speed to function properly. This is also true of certain modems and serial-interface cards. The Zip Chip utilities disk allows you to change the slot speeds and change the speed of the chip (16 different settings, from .667 MHz to 4.0 MHz) or turn it off completely.

The chip functions best with programs that do a lot of memory-intensive functions. I ran some before-and-after tests with *AppleWorks:* spreadsheet recalculations were about 3½ times faster with the Zip Chip, and the word processor's search-and-replace function was about 3 times faster, as were sorting and searching with the database. Disk operations are somewhat faster, but not significantly so. Games, especially arcade games, are best run at normal speed—*Pac-Man* at 4 MHz is interesting but unplayable. Applesoft BASIC low- and high-resolution screens are drawn about 3½ times faster, and math functions and string-manipulation programs run 2½–3 times as fast.

One of the Zip Chip's nicest features is that you can set custom speed configurations for each of your boot disks, DOS 3.3 or ProDOS. I've done so for all my games and for some applications where more speed is nice but full speed isn't. You can also hold down the Escape key while booting to cause the chip to run at normal speed—an important override feature.

I'm extremely pleased with my Zip Chip. Although the claim of 400-percent faster is somewhat exaggerated, you'll be amazed at the speed it will add to your Apple II.

— Vincent D. O'Connor, computer consultant

PC Transporter

PC Transporter is an IBM PC–compatible computer you can hold in your hand. Better still, you can put it in an empty slot on your Apple IIe or IIGS. The board also works—with more difficulty, however—in an Apple II+. Except for peripherals and PC slots, PC Transporter is a complete computer on a card.

PC Transporter runs under the Apple ProDOS operating system. (In fact, one of the ex-Apple employees who designed PC Transporter for Applied Engineering was the engineer who wrote ProDOS.) The advantage of this ingenious design is that all of your Apple peripherals look like MS-DOS devices while you're running IBM PC software. This preserves your investment in printers, modems, clocks, and other devices. You can even partition your hard disk for use with both Apple and IBM PC files.

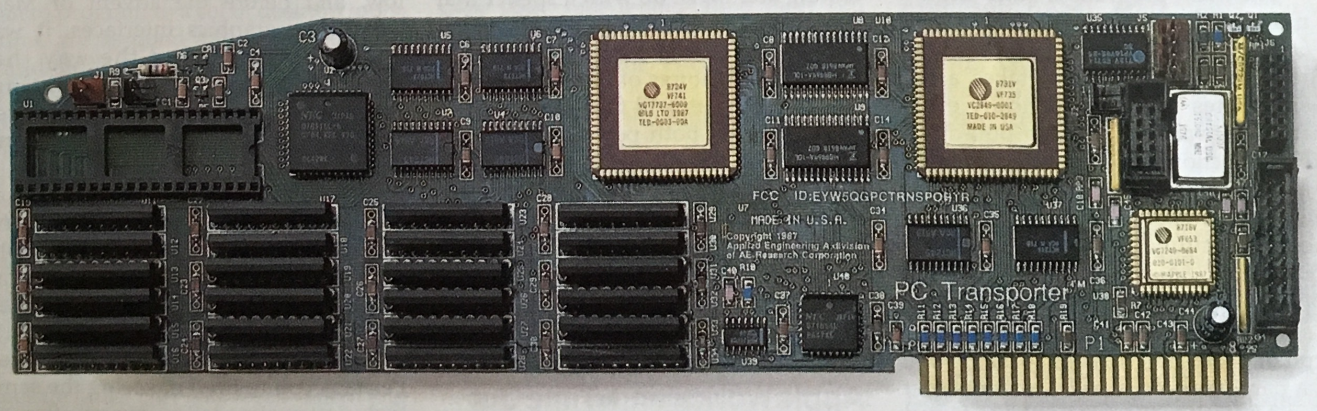
PC Transporter runs almost all IBM PC software, including *Lotus 1-2-3, dBase,* and *WordStar.* Some copy-protected games do not run, although *Flight Simulator,* often considered a benchmark for PC compatibility, runs flawlessly. The product's Norton speed index is 3.5, which means that PC Transporter runs more than three times faster than a standard IBM PC XT.

PC Transporter requires a disk drive that can read MS-DOS–formatted disks. Apple 5¼-inch drives and Unidisks will not work for this purpose, but Apple 3½-inch drives will. A typical Apple IIGS system that includes one or two 3½-inch drives works fine. You can also buy a TransDrive—in either one- or two-drive configurations—from Applied Engineering that reads MS-DOS 5¼-inch disks.

The Apple side of your system is significantly enhanced by PC Transporter, even when you aren't running MS-DOS. You have almost a megabyte of extra memory which you can use as a ramdisk, as an expanded *AppleWorks* desktop, or as a combination of the two. If you have a IIe, PC Transporter lets you plug in the same Apple 3½-inch drive used by the IIGS and the Macintosh. And if you buy a Transdrive for 5¼-inch MS-DOS software, you can use those drives to store three times as much data on an Apple 5¼-inch floppy disk.

The real value of PC Transporter is that it lets you use expensive peripheral devices interchangeably in Apple and IBM modes. In addition, you can switch painlessly from one world to the next and exchange data without cables. Unless you plan to throw your Apple away or sell it, there's no way a PC clone can compete with PC Transporter—in price or convenience.

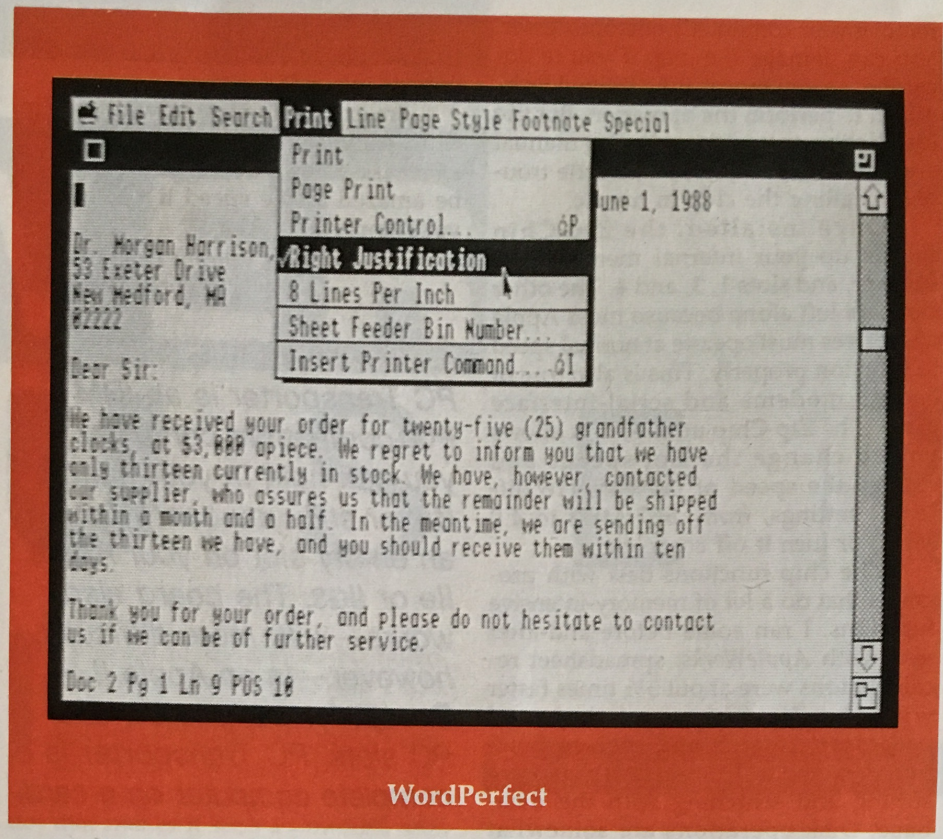
— Steve High, "AppleWorks for Everyone" columnist ▷



PC Transporter

WordPerfect

Six years is a long time. Six years ago, I had settled on *WordStar* as the word processor for my Apple II+. *WordStar* had more useful commands than any other word processor. In fact, it had so many commands that, while I had memorized the more common ones, I had to look up the rest on the Quick Reference Card. Today, things have changed.



WordPerfect

Today, we've come to expect not only a vast array of features in power word processors, but also a way to easily use those features. You shouldn't have to refer to a piece of cardboard just to delete a line of text.

Enter *WordPerfect* for the Apple IIGS. Not only does it offer most of the features of its more expensive IBM PC cousin, but it has most of the ease of use associated with its Macintosh relative. At $179, the IIGS version of *WordPerfect* offers multiple document screens that can handle several documents at once; a built-in thesaurus—with 10,000 headwords—which displays both synonyms and antonyms; a 115,000-word spelling checker that has pattern lookup and word-count features, as well as the ability to examine a document for double words; a merge feature for customized mass mailings, reports, and automated office procedures; and a flexible footnotes and endnotes option.

The main program is quite large—it muscles its way into 569 blocks on a 3½-inch disk (the package comes with three 3½-inch disks) and takes a full two minutes to load. Practically every feature is available through pull-down menu selections—I counted 78 primary menu selections and 41 secondary menu selections. Many of the primary menu selections also have keyboard equivalents, so you can use keyboard commands for your favorite features.

Other features include widow and orphan protection (to avoid a single line of a paragraph on a page), macros that record both *WordPerfect* commands and text, file management (extensive file commands available from within *WordPerfect*), a default set (to save keyboard equivalents, formatting variables, pathnames and prefixes, edit-buffer size, and a startup macro), hyphenation (on or off, soft or hard hyphens, and a variable hyphenation zone for word-wrap), extensive block selection (append, case conversion, copy, cut, delete, paste, print, and save), and a comprehensive help feature (would you believe 133 help topics?).

A stripped-down version, *WordPerfect* for the IIe and IIc offers no mouse interface or pull-down menus—just lots of keyboard commands. You'll have to rely on the familiar Quick Reference Card or a better-than-average memory. You'll also have to do without a thesaurus and multiple-document editing and make do with a speller that contains only 50,000 words. While it may not be as easy to use, it does offer most of the features of the IIGS version.

IIGS owners will find their version of *WordPerfect* both powerful and easy to use. For IIe and IIc owners, *WordPerfect* is a thinner but still powerful word processor.

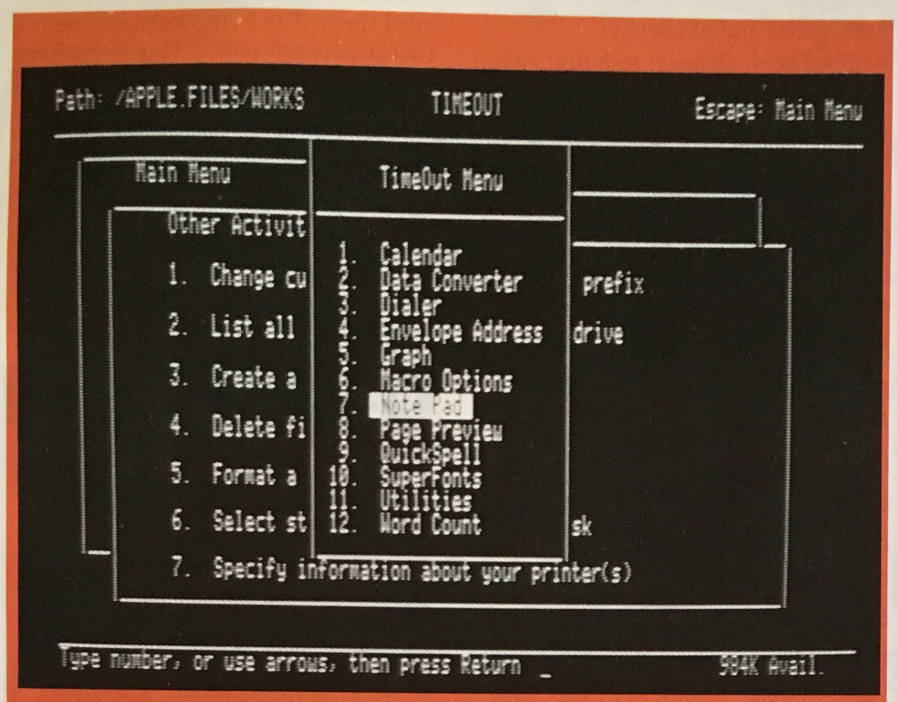
— David English, assistant editor, COMPUTE! Publications

AppleWorks and TimeOut

Nearly every Apple II user—power user or not—is familiar with AppleWorks. *The integrated program may be old, but it is ubiquitous. The classic combination of word processor, spreadsheet, and database offers plenty for the beginner, more than enough for the intermediate user, and the basics for even the most advanced Apple II owner.*

AppleWorks' most vital trait, its blazing speed, especially when placed entirely in RAM, is renowned. Its file-folder metaphor is easy to understand and follow, and before the advent of Macintosh-like graphics interfaces, it was state-of-the-art. And the way that *AppleWorks* handles text, printing, spreadsheet creation, and database management is—for all its options and quirks—simple.

But that simplicity can be a bane as well as a benefit. If you've been using *AppleWorks* for some time, you've probably run up against its limitations. Maybe you've wanted to create eye-catching charts to illustrate the data you've accumulated in a spreadsheet. Perhaps you're tired of seeing the same look, letter after letter, report after report, when you print out your word processing documents. Or it may be that you're just wasting time using the same complex commands again and again. In



AppleWorks and the TimeOut series

other words, you're a power *AppleWorks* user, and you've almost exhausted the power possibilities of the program.

Do you ditch *AppleWorks?* Do you let go of your Apple II altogether and head for the high ground of MS-DOS?

Of course not. *AppleWorks* may be showing its age, but thanks to energetic (and profit-minded) software developers, there's plenty of life left in that *AppleWorks* disk in your drive.

Beagle Bros., a publisher with a long history in the Apple II community, last year released its first series of TimeOut *AppleWorks* add-ons. Requiring *AppleWorks* 2.0 or higher, the add-ons range from a chart-graphing package to a spelling checker, from a macro program to a set of desktop tools. Some are as good and as powerful as stand-alone packages—and cost just as much. Others are limited in their abilities. All, however, share the one thing that makes the TimeOut series an indispensable addition to every power *AppleWorks* user's collection: They work *from within AppleWorks*. You can call up any installed TimeOut program in moments without quitting the application. That saves time, frustration, and sometimes data.

The current list of TimeOut packages includes *Ultramacros,* a macro creator and player; *Quickspell,* a spelling checker; *Thesaurus,* an online synonym finder; *Superfont,* a print enhancer that offers Macintosh-quality fonts; *Graph,* a chart creator; *Filemaster,* a file-maintenance collection; and several others.

Once installed on an *AppleWorks* disk, any TimeOut program can be called with a few keystrokes. When its work is done, it can be instantly put away and *AppleWorks'* work resumed. Creating a graph or chart, for instance, requires that you select data from a spreadsheet file; once you've printed the chart, you can return to *AppleWorks,* perhaps to manipulate the spreadsheet's numbers one more time.

TimeOut programs work best when you make them memory-resident. That makes *AppleWorks'* boot time longer, as the TimeOut applications are loaded into memory then, but it will save you considerable time later on, something especially true of the larger TimeOut programs, such as *Quickspell* and *Graph.*

If you have the money and decide to invest in several TimeOut packages, a 3½-inch disk drive is a distinct advantage. Even though you can keep the TimeOut programs on a different disk from the one containing *AppleWorks,* the limited space on a 5¼-inch disk may force some disk swapping or relegate your data to a third disk. Because the TimeOut programs aren't copy-protected, you can install them on your hard disk, an important consideration to more and more Apple II owners.

The *AppleWorks*/TimeOut combination is a good reason to stick with *AppleWorks* and, in my experience, makes my Apple II as productive now as it was the day I bought it.

— Gregg Keizer, editor, COMPUTE! Publications

Power Programming

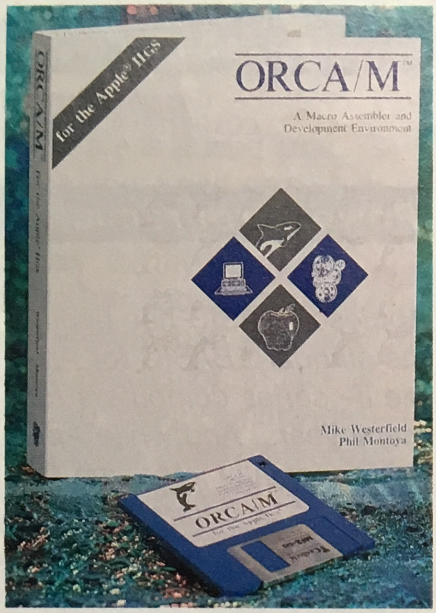
IIGS BASIC

***Applesoft BASIC has been the standard BASIC for Apple II– series computers for many years. And while Apple has constantly improved the quality of its computers, Applesoft BASIC has remained unchanged. Consider the IIGS: Spectacular sound and graphics can be created using the IIGS Toolbox routines, but the Toolbox can't be called from Applesoft. To solve these problems, APDA is introducing* IIGS BASIC.**

IIGS BASIC is a BASIC interpreter operating in an environment similar to Applesoft BASIC's. The first thing you'll notice is that the prompt has changed from a right bracket to a right parenthesis. Editing is also different; instead of pressing Escape, moving to the line you wish to edit, and pressing Escape again, you type **EDIT *linenumber***. This displays the line you've requested and allows you to edit it using the arrow keys.

IIGS BASIC has an extensive list of statements and functions. Most of the Applesoft BASIC statements you've come to know and love—PRINT, HOME, GOSUB, and so on—are included. Some statements have been enhanced. The IF statement, for example, now allows IF–THEN–ELSE constructs without using a GOTO statement. In addition, *IIGS BASIC* adds a host of new statements and functions: LOCAL (to declare a local variable in a procedure or function), HLIST (to do a HOME and a LIST), JOYX (to read a game paddle's input), and more.

A good method of programming is to break a program into several smaller tasks. For example, a card game can be thought of as shuffling the cards, dealing the cards, betting, and so on. With *IIGS BASIC,* each of these tasks can be



ORCA/M Assembler

handled by a separate section of code called a *procedure*.

Where *IIGS BASIC* really shines is its interface to the Toolbox. Every tool set has a corresponding TDF (Toolbox Definition File) that contains a dictionary of interface definitions. TDFs are loaded into a program using a LIBRARY statement. Once a TDF is loaded, the procedures in that tool set are accessed using a CALL statement. Functions in the tool set are accessed using an EXFN statement. The Toolbox is not explained in the manual, but this is understandable, since it contains hundreds of functions and procedures. APDA sells two books (*Apple IIGS Toolbox Reference*, Volumes 1 and 2) that explain how to use the functions and procedures in the Toolbox.

The documentation, while complete, may be cryptic and hard to read at first. The syntax of *IIGS BASIC* statements are described in *Backus-Naur Form*. Backus-Naur Form is a notational scheme used in computer science. It's very concise and fully describes the language, but it may take a bit of getting used to. Luckily, each statement and function comes with a short, informative example.

IIGS BASIC is much more powerful and bug-free than Applesoft BASIC. It allows access to the Toolbox for spectacular sound and graphics, plus windows, menus, powerful text-editing tools, and more. APDA plans to release a *IIGS BASIC* compiler soon. This will give BASIC programmers a nearly ideal environment in which programs can be developed quickly using the *IIGS BASIC* interpreter and then compiled for maximum speed and efficiency.

— Jim Fuchs, assistant technical editor, COMPUTE! Publications

ORCA/M Assembler

This macro machine language assembler from The Byte Works is as powerful as the killer whale for which it's named. A good assembler is required for writing professional-quality machine language programs, and this excellent package provides the tools you need to create quality application programs and arcade games.

ORCA/M Assembler is available for both the Apple II and IIGS. The Apple II version requires at least 64K of memory and an 80-column card. I recommend at least 256K of RAM—even more is better. The IIGS version takes advantage of the 65816 instruction set. Personally, I use *ORCA/M Assembler* version 4.1 for the Apple IIe, IIc, and II+.

ORCA/M Assembler comes with its own ProDOS environment, one that includes an editor and a UNIX-like shell. The shell program allows I/O redirection and features online help files. The full-screen editor is a hundred times better than the standard Applesoft BASIC editor. It makes entering and editing source code quick and easy. It features search and replace and the ability to cut, copy, and delete blocks of text. One minor drawback is the source-code size limitation (about 17K). There's no limit to the size of programs (object code) because you can chain source files during assembly.

The real power is in the assembler's extensive macro libraries. (*ORCA/M* is *macro* spelled backwards.) A macro is source-code shorthand. *ORCA/M Assembler* comes with macros for I/O, graphics, and mathematics. This makes writing programs easier because you don't have to reinvent simple routines. The adventuresome can build custom macros that incorporate other macros.

The manual makes no attempt to teach you assembly language and there are no flashy routines for you to type in and assemble. Instead, the documentation concentrates on getting you quickly acclimated to the new programming environment. The excellent command-line interface lets you explore the system, learning new commands as you need them. The Byte Works also sells a Pascal package and a Tiny C package that are compatible with the *ORCA/M* environment and editor.

This superb assembler package makes the difficult task of machine language programming easier. I highly recommend it for expert programmers and novices who want to become experts.

— William Chin, program designer, COMPUTE! Publications

Power Products

AppleWorks
Claris
440 Clyde Ave.
Mountain View, CA 94043
(415) 962-8946
$249.00

ORCA/M Assembler
The Byte Works
4700 Irving Blvd. NW, No. 207
Albuquerque, NM 87114
(505) 898-8183
$69.95—IIGS
$99.95—IIe, IIc, and II+

PC Transporter
Applied Engineering
P.O. Box 5100
Carrollton, TX 75011
(214) 241-6060
$489.00—384K system
$699.00—768K system

TimeOut Series
Beagle Bros.
6215 Ferris Sq.
Suite 100
San Diego, CA 92121
(800) 345-1750
$25.00–$89.95

IIGS BASIC
APDA
290 SW 43rd St.
Renton, WA 98055
(800) 426-3667
$50.00 (APDA members only)

WordPerfect
WordPerfect
288 W. Center St.
Orem, UT 84057
(801) 225-5000
$179.00

Zip Chip
Zip Technologies
11340 W. Olympic Blvd.
Suite 350
Los Angeles, CA 90064
(800) 321-7200
$179.00

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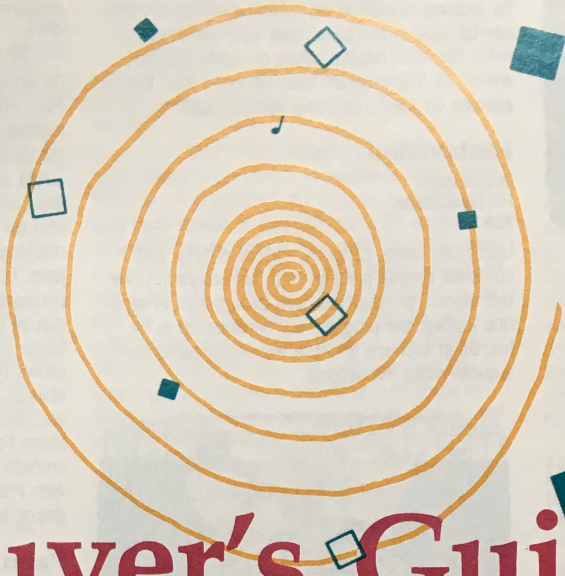


Buyer's Guide to Apple IIGS Graphics and Sound

Bring out the GS in your Apple with this complete guide to 33 graphics and sound programs for the most artistic and musical Apple II.

Mickey McLean

Graphics and Sound

HyperStudio

Roger Wagner Publishing
Requires 768K
$129.00

This hardware-and-software package includes a sound-digitizing card, a microphone, an external speaker with built-in amplifier, the *HyperStudio* program, *Sound Shop* digitizing software, and *Sight and Sound,* which allows users to design custom startup screens and to replace the computer's "beep" noise with any digitized sound. Other applications include clip art and clip sounds.

Graphics

Art & Film Director

Epyx
Requires 768K
$79.95

This two-in-one software package is part of Epyx's Designer Series. *Art Director* is a full-featured paint program. Onscreen menus and icons allow the computer artist to choose from a variety of shapes, lines, and colors. Features include stretch, bend, bulge, distort, and perspective. The *Film Director* portion of the package utilizes cell animation to transform artwork into graphics presentations. A library of sound effects, artwork, and animation sequences is included with the program. Animation can be recorded on a VHS tape or a disk.

Art Parts: Volume 1

Electronic Arts
Requires *Deluxe Paint II*
$29.95

This disk contains over 175 color clip-art images of faces, maps, charts, birds, plants, and fantasy art such as dinosaurs, African landscapes, and alien creatures. It can be used with *Deluxe Paint II, Deluxe Video,* or *Deluxe Print.* Volume 1 is still available but is being replaced by Volume 2.

Art Parts: Volume 2

Electronic Arts
Requires *Deluxe Paint II, Deluxe Print,* or *Deluxe Video*
$29.95

Art Parts: Volume 2 is a collection of clip art containing over 124 images and brushes on a variety of subjects: stars and planets, lettering, street scenes, farm animals, human faces, and more. The images can be modified with *Deluxe Paint II*'s tools.

Clip Art Gallery

Activision
Distributed by Mediagenic
Requires a paint program
$29.95

Clip Art Gallery includes over 650 graphics to use with *Paintworks Plus, Writer's Choice elite,* and other Apple IIgs paint programs. The collection contains 24 categories such as academic, award, animals, business, fantasy, holidays, outer space, party, sports, and symbols. *Clip Art Gallery* is included with the latest versions of *Paintworks Plus.*

ComputerEyes

ComputerEyes version 2.2

Digital Vision
Requires 512K
$249.95

This software-and-hardware package includes a digitizer circuit board and the latest system software. *ComputerEyes* supports all of the graphics capabilities of the Apple IIgs and connects the computer and any standard video source. Under software control, the video signal is scanned and images are captured into the graphics memory of the computer. The software features refined color calibration, compatibility with *Print Shop IIgs*, optional color and black-and-white dithering, a freeze-palette option, and improved standard high-resolution display.

Deluxe Paint II

Electronic Arts
Requires 768K
$99.95

Deluxe Paint II incorporates a variety of paint tools, including ten built-in brushes, stenciling, four levels of zoom, dotted freehand, continuous freehand, straight line, curve, circle, polygon tools, over 65 fills, and a palette of 16 colors created from 4096 shades. The brush tool can be flipped, stretched, and rotated, or used like an airbrush. Spaces can be filled with patterns, solid colors, or gradient colors. The fixed background allows the painter to attach a picture to the background so that it will not be removed when it's painted over. With the perspective feature, elements can be rotated in three dimensions around a fixed point to create perspective. A range of colors is cycled through a static image to create the illusion of motion in the color-cycling option; up to four cycles per picture can be stored. Pictures can be sent to selected printers, and the program supports color printing on the Apple ImageWriter II and other color printers. An art disk is included.

Draw Plus

Activision
Distributed by Mediagenic
Requires 512K
$89.95

This object-oriented drawing program allows users to create logos and letterheads, flow charts, forms, organizational charts, graphics layouts, floor plans, furniture arrangements, presentation graphics, and landscape designs. The program can import paint files and support measured angles shown in degrees.

816/Paint

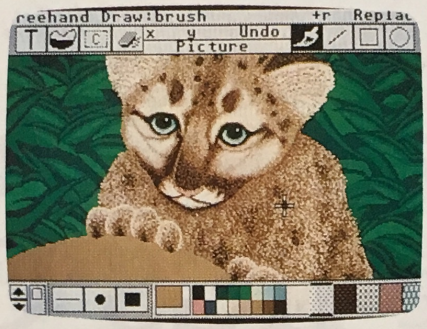
Baudville
Requires 512K
$75.00

816/Paint works in all Apple high-resolution graphics modes, including super-hi-res, with 4096 colors. It contains numerous tools for painting and freehand drawing, including 12 brushes, lines, an airbrush, text capabilities, geometric shapes, marquee and lasso functions, and a French-curve tool for plotting smooth curves. Eight separate palettes can be used at the same time, and color cycling helps the artist modify colors or create pseudo-animation. The program uses an icon menu that appears on the screen only when needed.

Fantavision

Brøderbund
Requires 256K
$59.95

Users can create cartoons, special effects, and complete motion pictures with this program. Once two objects or creatures have been drawn in separate frames, the program will generate up to 64 frames in between to make the first drawing turn smoothly into the second.



The Graphics Studio

The Graphics Studio

Accolade
Requires 768K
$49.95

This paint program and graphics editor can be used to create pictures in 8½ × 11 inch format using a palette of 4096 blended colors and an assortment of patterns. Text in a variety of type sizes and styles can be added to any design. The program features a double screen–size drawing area, a full-screen clipboard, a user-programmable color-cycling tool to produce animated pictures, an 8 × 8 pixel pattern capture, mirror symmetry effects, and user-definable erasers. An image or portion of a drawing can be resized, flipped, or rotated; *x* and *y* coordinates can be displayed; and the palette of colors can be changed. Drawing tools include lines, boxes, ellipses, circles, rays, single-color and pattern fills, zoom with four levels of magnification, and copy and move. Artwork can be saved to disk or printed on compatible printers.

Image Master: Basic Paint

JADA Graphics
Requires 512K
$44.95

A paint program designed for all ages, *Image Master: Basic Paint* offers 64 built-in palettes of color, an unlimited number of user-definable palettes, and a color-editing system to create over 8 million color mixtures. The screen can display 136 colors at one time, and—with the gradient editor—horizontal, vertical, two-dimensional, angled, and concentric shading can be added. Standard paint features include full-screen painting, ten levels of zoom, text with graphics, cut, paste, copy, custom brushes, color cycling, flipping, inverting colors, and mirrored painting, plus printout capabilities with ImageWriter and ImageWriter II. The program includes a 30-day guarantee.

Paintworks Gold

Activision
Distributed by Mediagenic
Requires 1.25 megabytes of RAM and a 3½-inch drive
$99.95

An expansion of the paint program *Paintworks Plus, Paintworks Gold* offers the artist 80 additional features that utilize the advanced graphics capabilities of the Apple IIgs. There are two full pages to create art, so one page can be used as a draft or a fixed background. Up to 16 colors can be selected with the gradient color-blending function, and color masking helps prevent painting over colors or objects. Objects can be created and viewed in a 3-D perspective, which can be automatic. Color cycling can be used to simulate animation, or frame-by-frame animation can be constructed. Slippy colors allows the user to capture and move colors and objects, or colors can be smeared with the shadow and contour options. Other tools include variable-zoom FatBits, shrink, stretch, bend, distort, and a smooth tool to remove jagged edges. Files created with *Paintworks Plus* and other IIgs graphics programs can be used with *Paintworks Gold*.

Paintworks Plus

Activision
Distributed by Mediagenic
Requires 512K
$69.95

A paint program for the Apple IIgs, *Paintworks Plus* contains a *MacPaint*-style interface and help screens. It provides over 4000 colors and 16 built-in, customizable patterns. The lasso tool can be used to pick up an object without the surrounding area, and mirror commands help draw symmetrical shapes. Full-screen animation is available, and the page-preview function displays the whole picture before it is printed. The program is not copy-protected. *Clip Art Gallery,* a collection of clip art to use with the program, is included in the package.

Paint Write Draw

Activision
Distributed by Mediagenic
Requires 512K
$129.95

This package includes *Paintworks Plus, Clip Art Gallery, DrawPlus*, and *Writer's Choice elite,* a color word processor.

Postcards

Activision
Distributed by Mediagenic
Requires 512K
$29.95

Postcards is a collection of clip art—warthogs, dogs, rhinos, the Mona Lisa, food, aliens, and more—that can be used to create postcards, invitations, memos, and other personal notes. Plus, there are backdrops such as landscapes and beach scenes on which to place the graphics. Personal messages can be typed in or phrases and letters from the collection can be added. A paint program is included so users can design their own notes.

The Print Shop Graphics Library Party Edition IIGS

Brøderbund
Requires *The Print Shop IIgs*
$34.95

Party Edition supplies users with over 180 graphic elements for barbecues, balls, birthdays, graduations, holidays, or bon voyage parties. The program can be used to design announcements, signs, and cards. It contains 16 multicolored, full-panel designs.

The Print Shop Graphics Library Sampler Edition IIGS

Brøderbund
Requires *The Print Shop IIgs*
$34.95

Users will find over 190 graphics and design elements created for the Apple IIgs. The program includes fonts, borders, background and pixel patterns, and full-page designs. Covered themes include holidays, birthdays, school, and sports.

The Print Shop IIGS

Brøderbund
Requires 512K
$59.95

Features include over 120 unique, multicolored graphics and many full-panel designs. Users can create their own designs with the Graphic Editor. A Trim feature allows users to add borders to horizontal or vertical banners. Designs from *The Print Shop* for the Apple II can also be used.

Seasons & Holidays

Electronic Arts
Requires *Deluxe Paint II*, *Deluxe Print*, or *Deluxe Video*
$29.95

Seasons & Holidays contains over 100 color clip-art images representing holidays, birthdays, weddings, parties, and other special occasions. The clip art can be added to *Deluxe Paint II* pictures and *Deluxe Video* productions, or it can be used with *Deluxe Print* to print cards, stickers, banners, and certificates.

ShowOff

Brøderbund
Requires 512K
$59.95

ShowOff allows users to produce overhead transparencies, onscreen slide shows, and hardcopy printouts and handouts. The program contains over 380 professional-quality graphics, 126 different borders, and an Icon Editor, which allows the creation of graphics by the user. Different print styles and sizes can be mixed and matched in 16 colors. Graphics can be imported from *The Print Shop IIgs* and other IIgs paint programs.

ShowOff Graphics Collection: World Events

Brøderbund
Requires *ShowOff*
$34.95

This supplement to *ShowOff* contains over 200 graphics and backgrounds in super-high-resolution color. The program provides full map backgrounds of continents and graphics of countries such as France, England, and Japan. An assortment of icons includes topics such as people, medicine, news, and economics.

TopDraw

StyleWare
Distributed by Claris
Requires 512K
$89.95

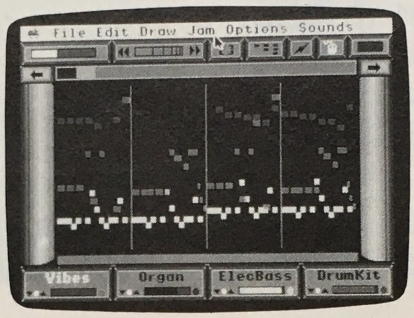
A draw program designed for the Apple IIgs, *TopDraw* uses Macintosh-like pull-down menus to access the 4096 colors and object-oriented graphics features. The drawing size and shape are user-defined, as is the view scaling. Drawing options include movable palettes, polygon smoothing, and corner radius editing. Colors and patterns can also be edited. This program works with other major IIgs graphics programs such as *Deluxe Paint II* and *PaintWorks Plus*, and it supports the LaserWriter and color ImageWriter II.

Sound

Hot & Cool Jazz

Electronic Arts
Requires *Instant Music*, *Deluxe Video*, or *Deluxe Music Construction Set*
$29.95

This music-library disk contains over 40 jazz songs from ragtime to fusion and covering a period from 1900 to the present. It can be used to create multiple track scores or just listened to for pleasure. Instrument sounds include jazz drum kit, comp piano, banjo, brush kit, solo harmonica, high piano, chord piano, jazz sax, chord harmonica, trombone, violin, and low piano. The disk collection can be used with *Instant Music*, *Deluxe Video*, or the *Deluxe Music Construction Set*. The accompanying 30-page manual contains a history of jazz, some tutorials, a list of 50 recommended jazz records, and a glossary of musical terms.



Instant Music

Instant Music

Electronic Arts
Requires 512K
$49.95

This program uses red, green, and blue color bars to represent pitch and duration, so even nonmusicians can create original music with this program. Three instruments—from a selection that includes guitar, bass, drums, piano, and sax—can be played at one time, and music can be output to MIDI. Editing features include cut, copy, paste, zoom, volume, and tempo for songs up to 32 measures long. New instrument sounds can be created using the synthesizer feature, and MIDI users can add a drum machine to the piece. A library of over 40 songs is also on the disk. MIDI instruments are not included.

Instant Synthesizer

Electronic Arts
Requires 768K
$79.95

Instant Synthesizer features a visual interface for all levels of musicians to create music and experiment with new instruments. Users can expand the number of instruments in existing music programs such as *Instant Music*. Low-end MIDI keyboard users and musicians working with sound-sampling boards can create more instruments, capturing live sounds or using the keyboard as a drum machine or extra synthesizer. The program supports sound-sampling cards such as Future Sound and Digitizer Professional. Users can capture live sounds, graphically edit the wave form, adjust the attenuation, cut parts of the wave, loop segments, and find loop points automatically. Musicians can use the computer's keyboard to play sounds or add a MIDI connector to work with any MIDI device. Sounds can also be created in *Instant Synthesizer* and played from an external keyboard.

It's Only Rock 'N Roll

Electronic Arts
Requires *Instant Music*
$29.95

People with no musical experience can use this disk library with *Instant Music* to listen to 40 rock songs or to create new songs with the cut, copy, and paste features. There are eight categories of songs: Memphis, 1956—rhythm and blues; Philadelphia, 1959—pop and early 1960s beat; Detroit, 1962—Motown sound; Chicago, 1965—rock blues; San Francisco, 1968—acid rock; Los Angeles, 1971—heavy metal; London, 1974—progressive rock; and New York, 1977—new wave. Instrument sounds include a range of guitars, synthesizers, and keyboards; trumpet; rock sax; and fiddle. The package also contains a manual.

Jam Session

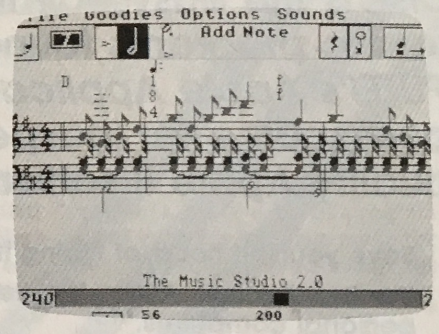
Brøderbund
Requires 512K
$49.95

Users can hit any combination of keys on the keyboard and make music in harmony with the computer-animated band. All sounds are digitally recorded from actual instruments. Jam sessions are possible with a heavy metal band, or users can join in on classical, jazz, or country sessions. Users can save the sessions for future listening.

Music Construction Set

Electronic Arts
Requires 256K
$14.95

Users can compose, edit, save, print, and play music with this program. It includes accidentals, octave raisers, triplets, dotted notes, and ties, along with graphic displays.



The Music Studio 2.0

The Music Studio 2.0

Activision
Distributed by Mediagenic
Requires 512K
$99.95

Professionals and amateurs can use this program to create their own musical compositions. The editor lets users change tempo, duration, and volume. New instruments and sound effects can be created by modifying the attack, sustain, release, and decay features. The paint box provides a place for experimenting with new sounds or melodies, and the piece can then be copied into the editor. The music can be printed in sheet-music form, and the program can be used with electronic keyboards. Up to three verses can be added to a song, and a

library of original compositions is included. The Apple IIgs version features realtime MIDI input and more than 20 digitized instruments.

Pyware Instrument Designer

Pygraphics
Requires 512K
$129.00

Users can create instrument sounds using the built-in Apple IIgs sound chip. Sound waves can be altered to create acoustic instruments or original sounds. The program demonstrates how sound is affected when sound waves are modified. *Pyware Instrument Designer* is designed for both students and teachers of music and physics.

Pyware MIDI Translator

Pygraphics
Requires *Pyware Music Writer*
$79.00

Used in conjunction with the *Pyware Music Writer*, the *Pyware MIDI Translator* converts sequencer files into notation files.

Pyware Music Writer version 1.3 (Limited Edition)

Pygraphics
Requires 768K
$119.00

This professional music-notation and -composition program allows two-handed keyboard input and additional MIDI and printing features, including support for the Apple LaserWriter. *Limited Edition* features three saves. *Special Edition* ($295) has six saves, and *Professional Edition* ($595) has 32 saves.

Apple IIGS Graphics and Sound Publishers

For more information on the graphics and sound software listed in the "Buyer's Guide to Apple IIgs Graphics and Sound," contact these publishers:

Accolade
550 S. Winchester Blvd.
Suite 200
San Jose, CA 95128

Activision, distributed by
Mediagenic
3885 Bohannon Dr.
Menlo Park, CA 94025

Baudville
5380 52nd St. SE
Grand Rapids, MI 49508

Brøderbund
17 Paul Dr.
San Rafael, CA 94903-2101

Digital Vision
66 Eastern Ave.
Dedham, MA 02026

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404

Epyx
600 Galveston Dr.
P.O. Box 8020
Redwood City, CA 94063

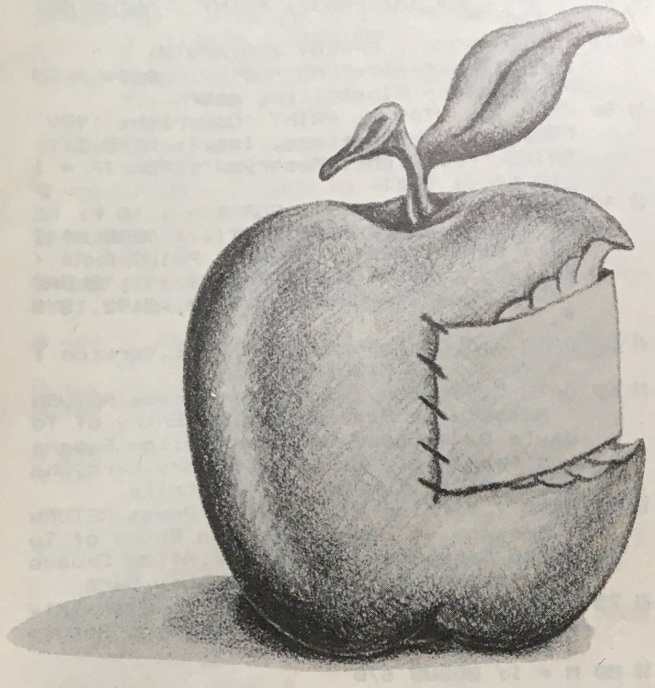
JADA Graphics
7615 S. 48th St.
Omaha, NE 68157

Pygraphics
P.O. Box 639
Grapevine, TX 76051

Roger Wagner Publishing
1050 Pioneer Wy.
Suite P
El Cajon, CA 92020

Styleware, distributed by
Claris
440 Clyde Ave.
Mountain View, CA 94043

aa



Customize your copy of *AppleWorks* to speed up the cursor, bypass the *Press RETURN* message, stop the inconvenient ramdisk preload operation, and more. *AppleWorks* version 1.3 or 2.0 required.

Vincent D. O'Connor

Patch Kit

AppleWorks is *the* best-selling Apple program ever, and with good reason. It's one of the most useful programs ever written for the Apple II. But, as we all know, even a good thing can be made better. The proliferation of *AppleWorks* add-on programs, such as the Beagle Bros. TimeOut series, demonstrates that. Perhaps you have your own ideas about how to improve *AppleWorks*. Unfortunately, altering *AppleWorks* has always required an intimate knowledge of how the program works as well as some experience in machine language programming—that is, until now.

"Patch Kit" is a BASIC program that allows you to customize *AppleWorks*. You don't have to understand how it works or how to program in machine language to use it. Simply run the program, select the changes that you desire from a menu, and then exit the program. That's all there is to it.

Getting Started

Patch Kit is a BASIC program, so use "Apple Automatic Proofreader," found elsewhere in this issue, to minimize typing errors as you enter the program. Be sure to save a copy of Patch Kit to disk.

Before you run the program, make a copy of your original *AppleWorks* Startup disk and place the original in a safe place. You should use Patch Kit on the copy only. Never alter your original *AppleWorks* disk.

If you've modified *AppleWorks* using a patch program such as *Pinpoint*, make a copy of your original disk, make the changes you want with Patch Kit, and then re-install the patches added by *Pinpoint* or whatever program you used.

Customizing AppleWorks

Insert the disk that contains Patch Kit and enter **LOAD *filename***, where *filename* is the name you used when you saved the program. Place a copy of the *AppleWorks* Startup disk in the drive and enter **RUN**. A main menu appears with these three options:

```
1. Version 1.3
2. Version 2.0
3. Quit
```

Patch Kit lets you make modifications to *AppleWorks* version 1.3 or version 2.0. If you attempt to make changes to any other versions, you'll get an error message.

To make a selection from the menu, use the arrow keys or press the number key that corresponds to the desired option. An arrow points to the currently selected menu option. Press Return to make the selection final.

Let's look at each menu option.

Version 1.3

This option allows you to make five changes to *AppleWorks* version 1.3. These changes are:

1. Bypass 'Press RETURN' Message at Startup
2. Bypass Entry of Today's Date
3. Speed Up Cursor
4. Allow Expansion into Apple Standard Memory Card
5. Change Default Cursor to Overstrike

You can make any or all of these changes; it's up to you.

Bypass 'Press RETURN' Message at Startup. If you're running *AppleWorks* from a ramdisk, a hard disk, or a 3½-inch disk, there's no need for *AppleWorks* to prompt you to remove the Startup disk and replace it with the program disk. By choosing this program option, you can force *AppleWorks* to bypass the *Place PROGRAM disk in drive 1 and press RETURN* message.

Bypass Entry of Today's Date. If you have an Apple IIe or IIc with a clock card, or a IIGS with ProDOS version 1.4, *AppleWorks* already knows the correct time and date and does not have to prompt you for it. This option prevents *AppleWorks* from asking for the date.

Speed Up Cursor. Some people find the speed of *AppleWorks'* cursor blink to be too slow. This is especially true of users who own an Apple IIc with a clock plugged into the serial port. Choosing this option speeds up the cursor blink considerably.

Allow Expansion into Apple Standard Memory Card. Both *AppleWorks* versions 1.3 and 2.0 check to see if they're running on an Apple IIGS. If *AppleWorks* is running on a IIGS, then it won't expand into an Apple-standard memory card, such as the Ramfactor, to create a larger desktop. This menu option allows *AppleWorks* to use this extra memory.

Change Default Cursor to Overstrike. The *AppleWorks* cursor defaults to insert mode when you first run the program. Choose this option to make the *AppleWorks* cursor default to overstrike mode.

Version 2.0

The version 2.0 menu has the same five options offered by the version 1.3 menu, plus two:

6. Allow Entry of Control-@
7. Stop Ramdisk Preload

Allow Entry of Control-@. With the upgrade to version 2.0, *AppleWorks* not only gained several new features; it lost a few old ones. One of these missing features allowed you to enter a Control-@ null code. This code is used by many printers, including the ImageWriter. For example, to change the character set or to get slashed zeroes, you need to be able to enter a Control-@ when setting up a custom printer. This option changes *AppleWorks* 2.0 so you can enter Control-@.

Stop Ramdisk Preload. If you have extra memory configured as a ramdisk, *AppleWorks* will load itself into this RAM at startup. If you already have *AppleWorks* in RAM, such a preload is a waste of time. This option disables the automatic ramdisk preload for those who normally run *AppleWorks* from a ramdisk.

Quitting the Program

Once you've made the changes you want, press Escape and exit the program via the main menu's Quit option. This will save your changes to disk. *If you do not exit the program using the Quit option, your changes will not be saved and you will have to rerun the program.*

To run your modified version of *AppleWorks*, simply boot *AppleWorks* with the Startup disk that you used when you ran Patch Kit.

Patch Kit

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```
5C 10 PRINT CHR$ (4)"PR#3": PRINT : ONERR GOT
      O 420
F6 20 TEXT : HOME : SPEED= 255:AR$(0) = "    "
      :AR$(1) = "-->":FLAG = 0:SV = 0:D$ = CH
      R$ (4):T$ = "Installing patch..."
78 30 HTAB 20: VTAB 8: PRINT "Copyright 1989
      COMPUTE! Publications, Inc.": HTAB 31:
      PRINT "All Rights Reserved": FOR JF = 1
       TO 6000: NEXT
DD 40 READ K: DIM M$(K,9): FOR I = 1 TO K: RE
      AD IT(I): FOR J = 0 TO IT(I): READ M$(I
      ,J): NEXT : NEXT : PRINT : PRINT CHR$ (
      4);"FRE": PRINT : PRINT CHR$ (4);"BLOAD
       /APPLEWORKS/APLWORKS.SYSTEM,A8192,TSYS
      "
D2 50 DATA 3,3,AppleWorks Patch Kit,Version 1
      .3,Version 2.0,Quit
DD 60 DATA 5,Version 1.3,Bypass 'Press RETURN
      ' Message at Startup,Bypass Entry of To
      day's Date,Speed Up Cursor,Allow Expans
      ion into Apple Standard Memory Card,Cha
      nge Default Cursor to Overstrike
1A 70 DATA 7,Version 2.0,Bypass 'Press RETURN
      ' Message at Startup,Bypass Entry of To
      day's Date,Speed Up Cursor,Allow Expans
      ion into Apple Standard Memory Card
F4 75 DATA Change Default Cursor to Overstrik
      e, Allow Entry of Control-@,Stop Ramdis
      k Preload
5D 80 M = 1: GOSUB 670
A8 90 OP(M) = OP(M) + (OP(M) = 0):W = IT(M):
      GOSUB 610: IF CH = 20 THEN PRINT CHR$ (
      7);: GOTO 80
82 100 ON OP(M) GOSUB 120,170,220
AE 110 GOTO 80
CE 120 IF PEEK (8250) < > 180 THEN FLAG = 1:
      GOSUB 550: RETURN
82 130 M = 2: GOSUB 670
B9 140 OP(M) = OP(M) + (OP(M) = 0):W = IT(M):
       GOSUB 610: IF CH = 20 THEN RETURN
DE 150 ON OP(M) GOSUB 290,300,310,320,330
8E 160 GOSUB 410: GOTO 130
AE 170 IF PEEK (8250) < > 57 THEN FLAG = 2: G
      OSUB 550: RETURN
AC 180 M = 3: GOSUB 670
C3 190 OP(M) = OP(M) + (OP(M) = 0):W = IT(M):
       GOSUB 610: IF CH = 20 THEN RETURN
95 200 ON OP(M) GOSUB 340,350,360,370,380,390
      ,400
8F 210 GOSUB 410: GOTO 180
2F 220 VTAB 22: HTAB 25: PRINT "DO YOU REALLY
       WANT TO QUIT (Y/N)?" CHR$ (7);: POKE
      - 16368,0
E6 230 WAIT - 16384,128:CH = PEEK ( - 16384)
      - 128: POKE - 16368,0
E1 240 IF CH = 89 OR CH = 121 THEN 270
7E 250 IF CH = 78 OR CH = 110 THEN RETURN
1B 260 GOTO 230
0E 270 T$ = "Saving patches...": GOSUB 410: P
      RINT D$"UNLOCK /APPLEWORKS/APLWORKS.SY
      STEM": PRINT D$"BSAVE /APPLEWORKS/APLW
      ORKS.SYSTEM,A8192,TSYS": PRINT D$"LOCK
       /APPLEWORKS/APLWORKS.SYSTEM"
8D 280 CALL 54915: HOME : PRINT CHR$ (21): EN
      D
56 290 POKE 13193,44:SV = 1: RETURN
04 300 POKE 13855,208: POKE 13193,44: POKE 13
      856,19:SV = 1: RETURN
BF 310 POKE 12066,0: POKE 12071,0:SV = 1: RET
      URN
2F 320 POKE 13223,44:SV = 1: RETURN
D6 330 POKE 14248,1:SV = 1: RETURN
70 340 POKE 14468,44:SV = 1: RETURN
```

```
16 350 POKE 14148,208: POKE 14468,44: POKE 14
       149,19:SV = 1: RETURN
B0 360 POKE 12091,0: POKE 12096,0:SV = 1: RET
       URN
21 370 POKE 13600,44:SV = 1: RETURN
BA 380 POKE 14552,1:SV = 1: RETURN
52 390 POKE 11760,242:SV = 1: RETURN
33 400 FOR I = 13271 TO 13273: POKE I,234: NE
       XT I:SV = 1: RETURN

B6 410 HOME : VTAB 12: HTAB (40 - LEN (T$) /
       2): PRINT T$: FOR J = 1 TO 1000: NEXT
       : RETURN
BF 420 ER = PEEK (222):LN = PEEK (218) + 256
       * PEEK (219): IF ER = 255 THEN RESUME
EE 430 IF ER = 6 THEN M$ = "APLWORKS.SYSTEM N
       ot Found"
13 440 IF ER = 3 THEN M$ = "No Device Connect
       ed"
9B 450 IF ER = 4 THEN M$ = "Disk Is Write Pro
       tected"

68 460 IF ER = 8 THEN M$ = "I/O Error - Disk
       drive door open or no disk in drive"
B5 470 IF ER = 9 THEN M$ = "Disk Is Full"
B5 480 IF ER = 17 THEN M$ = "Directory Is Ful
       l"
66 490 HOME : VTAB 20: PRINT M$
CD 500 VTAB 22: PRINT "Correct the error and
       press <RETURN> to continue, or press <
       ESCAPE> to end."
2B 510 POKE - 16368,0: WAIT - 16384,128:K = P
       EEK ( - 16384) - 128: POKE - 16368,0
34 520 IF K = 13 THEN RESUME
99 530 IF K = 27 THEN POKE 216,0: CALL - 3288
       :SV = 0: GOTO 280
99 540 GOTO 510
98 550 HOME : VTAB 4
9A 560 IF FLAG = 1 THEN PRINT "Not AppleWorks
        version 1.3 - please check your Apple
       Works disk or manual."
8A 570 IF FLAG = 2 THEN PRINT "Not AppleWorks
        version 2.0 - please check your Apple
       Works disk or manual."
CF 580 PRINT : PRINT "Press any key to contin
       ue."
44 590 POKE - 16368,0: WAIT - 16384,128: POKE
        - 16368,0: RETURN
A5 600 VTAB 3 + 2 * N: HTAB 20: PRINT AR$(OP
       = OS);: RETURN
67 610 OP = OP(M)
B6 620 N = OP:OS = OP: GOSUB 600: VTAB 24: HT
       AB 56: CALL - 868
61 630 VTAB 24: HTAB 56: INVERSE : PRINT OP;:
        NORMAL : WAIT - 16384,128:CH = PEEK (
        - 16384) - 128: POKE - 16368,0: IF CH
        > 48 AND CH < W + 49 THEN OP = CH - 4
       8:N = OS: GOSUB 600: GOTO 620
35 640 CH = (CH = 10 OR CH = 21) - (CH = 8 OR
        CH = 11) + 10 * (CH = 13) + 20 * (CH
       = 27): IF CH = 0 THEN PRINT CHR$ (7);:
        GOTO 630
C7 650 OP = OP + CH * (CH < 10):OP = OP - W *
        (OP > W) + W * (OP < 1):N = OS: GOSUB
        600: IF CH < 10 THEN 620
BC 660 OP(M) = OP: RETURN
EC 670 HOME : IF M > 1 THEN PRINT "PRESS <ESC
       > FOR "M$(1,0)
F7 680 MN$ = " " + M$(M,0) + " ": VTAB 3: HTA
       B INT ((80 - LEN (MN$)) / 2): INVERSE
       : PRINT MN$: NORMAL
F0 690 FOR I = 1 TO IT(M): VTAB 3 + 2 * I: HT
       AB 24: PRINT I". "M$(M,I): NEXT
EE 700 VTAB 24: HTAB 26: PRINT "TYPE ENTRY OR
        USE ARROW KEYS: ";: RETURN
```

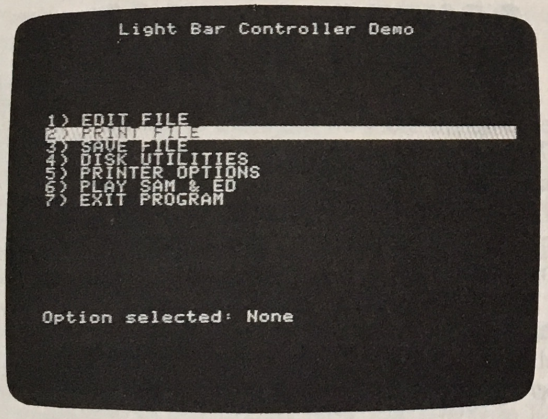
LIGHT BAR CONTROLLER

Here's a short machine language routine that helps you create friendly, *AppleWorks*-style menus.

Corey McKenzie

"Light Bar Controller" is a programming utility that makes it easy to create *light-bar* menus, where the selected option is highlighted by an inverse bar. Using the arrow keys, you select the option you want and then press Return. Many programs, including *AppleWorks*, use this type of menu because it's fast and easy to operate.

To create menus with Light Bar Controller, you simply print your menu options on the screen and call a machine language routine. It takes care of reading the arrow keys, moving the inverse bar, and returning the number of the selected option.



Create menus like this with "Light Bar Controller."

Typing It In

Light Bar Controller is short—only 207 bytes—so it shouldn't take you too long to type it in. Because Light Bar Controller is written in machine language, you must enter it using "Apple MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

STARTING ADDRESS: 0300
ENDING ADDRESS: 03CF

When you've finished typing in the program, save it to disk as LIGHT.

Making Menus

Let's go through the process of designing a simple menu with Light Bar Controller. The first thing you must do is load the machine language routine:

```
100 PRINT CHR$(4)"BRUN LIGHT"
```

Be sure that the disk containing the Light Bar Controller program is in the drive when you execute this code.

Next, print your menu options to the screen:

```
200 HOME: FOR I=1 TO 5: HTAB 10: VTAB I+7:
    PRINT I;". OPTION NUMBER ";I:NEXT
```

This line prints five menu options labeled OPTION NUMBER 1 through OPTION NUMBER 5. (You may want to use more descriptive names in your own programs.) There are certain rules you should follow when displaying light-bar menu options:

- Avoid using lowercase letters.
- Single-space your menu options.
- Each menu option must fit on one 40-column screen line.
- You must use 40-column mode for displaying light-bar menus.

With the menu options on the screen, it's time to call Light Bar Controller via Applesoft's ampersand command:

```
300 & 8, 12, OP%
```

As you can see, Light Bar Controller requires three parameters. The format for the ampersand command is

& *Top, Bottom, Option*

where *Top* is the screen line (1–24) of the first menu option on the screen, *Bottom* is the screen line of the last menu option on the screen, and *Option* is an integer variable—one that ends with a percent sign (%). *Top* and *Bottom* may be integer variables as well, but *Option* must be a variable because it is set equal to the number of the option selected.

When Light Bar Controller is activated, the first option in the menu is highlighted. Use the arrow keys to make a new selection. You may also use the number keys. Pressing 3, for example, selects the third menu option. To make a selection final, press Return. The number of the selected option is returned in the *Option* variable. To abort the menu without

making a selection, press Escape and *Option* will return a value of 0.

It's possible to reduce the width of the screen, and therefore the width of the light bar, by changing the size of Apple's text window. POKE the column position (0–39) of the left edge of the window into memory location 32 and POKE the new column width (1–40) into memory location 33. Light Bar Controller automatically adjusts the size of the light bar to the size of the text window.

To complete our sample program, let's print the name of the option selected and allow the user to rerun the program:

```
400 HTAB 1: VTAB 22: IF OP%=0 THEN PRINT "ESCAPE
    PRESSED. PROGRAM ABORTED.": END
410 PRINT "OPTION NUMBER ";OP%;" SELECTED.
    PLAY AGAIN?";
420 GET K$:IF K$="Y" OR K$="y" THEN 200
```

With these last three lines entered, you now have a working copy of the Light Bar Controller demo program. Type **RUN** to try it out. Using this program as an example, you should have no trouble using light-bar menus in your own programs.

Light Bar Controller

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```
0300: A9 4C 8D F5 03 A9 10 8D 6B
0308: F6 03 A9 03 8D F7 03 60 62
0310: 20 F8 E6 CA 86 4A 86 25 7D
0318: 20 BE DE 20 F8 E6 CA 86 3B
0320: 4B 20 BE DE 20 E3 DF 24 0E
0328: 81 30 03 4C 76 DD 24 82 16
0330: 10 F9 A5 4B 38 E5 4A 18 2C
0338: 69 B2 85 4D 20 93 03 AD 28
0340: 10 C0 AD 00 C0 10 FB C9 3C
0348: 88 F0 5A C9 8B F0 56 C9 4D
0350: 8A F0 64 C9 95 F0 60 C9 FB
0358: 9B F0 1A C9 8D F0 1D C9 7C
0360: B1 90 DC C5 4D B0 D8 29 63
0368: 0F 65 4A AA 20 93 03 CA 63
0370: 86 25 4C C9 03 20 93 03 EB
0378: A2 00 F0 0A 20 93 03 A5 89
0380: 25 38 E5 4A AA E8 A0 00 C2
0388: 98 91 83 C8 8A 91 83 AD 8B
0390: 10 C0 60 20 22 FC A4 21 4C
0398: 88 B1 28 29 BF 49 80 91 9C
03A0: 28 88 10 F5 60 20 93 03 EB
03A8: A6 25 E4 4A D0 03 A6 4B B7
03B0: E8 CA 86 25 4C C9 03 20 B0
03B8: 93 03 A6 25 E4 4B D0 03 69
03C0: A6 4A CA E8 86 25 4C C9 BF
03C8: 03 20 93 03 4C 3F 03 39 99
```

On Disk Only

For those of you who are interested in the detailed inner workings of this program, we've provided the fully documented source code for "Light Bar Controller" on this issue's *COMPUTE!'s Apple Applications Disk*. This source file is saved as LIGHT.S and was assembled using the *Merlin* assembler from Roger Wagner.

Look for the "On Disk Only" box in all *Apple Applications* articles. If a program or article can be enhanced by additional disk files, we'll explain them here and provide them on disk. For more information on ordering *COMPUTE!'s Apple Applications Disk*, see page aa

In the June issue of *COMPUTE!'s Apple Applications*, we published a program called "DataFlex." We have since been informed that Data Access Corporation claims a trademark in the name DataFlex.

Use the handy *Reader Service Card* in the back of the magazine to receive additional information on our advertisers.

Word Search

Ray Hill

You think up the words, and the computer makes them into a puzzle.

Here's a program that's both entertaining and educational. "Word Search" creates hidden-word puzzles where the words are hidden horizontally, vertically, and diagonally within a grid of letters.

Word Search was originally written to give spelling and typing practice to a remedial junior high school class. The program proved highly entertaining and adaptable—you can create word puzzles using vocabulary in any subject area. And since it's menu driven, it's easily learned. As soon as my eight-year-old daughter discovered the program, she began making word puzzles of her own.

Getting Started

Word Search is written entirely in BASIC, so use "Apple Automatic Proofreader," found elsewhere in this magazine, to minimize typing errors as you enter the program. Be sure to save a copy to disk.

When you're ready to make a puzzle, load the program and enter **RUN**. The program asks you for the puzzle size, from 5 × 5 to 15 × 15 letters. You must enter a number in the range 5–15. Next, Word Search asks for the puzzle's title. Enter a name and press Return.

The Puzzle Menu

Word Search offers the following menu:

```
P  = PRINT PUZZLE
V  = VIEW PUZZLE
N  = START NEW PUZZLE
W  = SHOW WORD LIST
Q  = QUIT PROGRAM
NEXT WORD OR COMMAND:
```

At this point, you may add words to the puzzle or make a menu selection.

Adding words to the puzzle is easy: Simply type in a word and press Return. Words must be longer than one character and cannot exceed the size of the puzzle (you can't enter a six-letter word into a 5 × 5 puzzle). Avoid entering spaces. After a brief pause, the computer prints *WORD* ADDED TO PUZZLE and redisplays the menu. If the word can't be placed into the puzzle, the computer displays the message *WORD* WILL NOT FIT IN THE PUZZLE. TRY A NEW WORD.

Word Search accepts as many as 40 words. When you reach the 40-word limit, the program tells you so and refuses to accept any more.

To make a menu selection, enter the appropriate letter (P, V, N, W, or Q) and press Return.

Sample Puzzle Printout

Can you find all the words?

```
                COMPUTERS

WORD LIST

RAM                 ROM
CPU                 CRT
FLOPPY              DISK
MODEM               MOUSE
APPLE               IBM

                  C R T P I Y M
                  A P P L E P O
                  X E U M R P U
                  Q L N A Z O S
                  R O M P I L E
                  K S I D B F W
                  M O D E M Y C
```

P (PRINT PUZZLE). This option makes a printout of the completed puzzle (see sample puzzle printout). Unused spaces are filled with random letters to help hide the puzzle's words. Be sure your printer is turned on and is online before you select this option. The printout includes the completed puzzle, plus a list of all the words contained in the puzzle. You can still add words to the puzzle after making a printout.

V (VIEW PUZZLE). To see what your puzzle looks like without making a printout, choose this option. The puzzle is displayed on the screen with asterisks (*) appearing in all the unused spaces.

N (START NEW PUZZLE). Select this to start a new puzzle. Word Search asks ARE YOU SURE? (Y/N), since starting a new puzzle erases the current one. If you answer Y, you must enter a new puzzle's size and name.

W (SHOW WORD LIST). This option lists all the words that have been entered into the puzzle so far. *Note: You cannot remove a previously entered word.*

Q (QUIT PROGRAM). Choose this to exit the program. If you select this option by mistake, immediately enter **CONT** at BASIC's bracket prompt (]) to reenter the program.

Modifying the Program

Currently, the largest puzzle size is 15 × 15. If you want to make a larger puzzle, and you don't care if the puzzle is too large to fit on the screen when viewed with the VIEW PUZZLE option, then change the 15 in line 190 to a larger number, such as 25. Similarly, if you want your puzzles to contain more than 40 words, change the 40 in lines 200 and 760.

Word Search

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```
BC 100 REM WORD FIND PUZZLE
05 110 HOME : PRINT
F5 120 VTAB 12: HTAB 13: PRINT "COPYRIGHT 198
       9"
5F 130 HTAB 7: PRINT "COMPUTE! PUBLICATIONS,
       INC."
11 140 HTAB 11: PRINT "ALL RIGHTS RESERVED"
FF 150 FOR JF = 1 TO 6000: NEXT
F6 160 HOME : VTAB (5)
ED 170 INPUT "PUZZLE SIZE (5 = 5 X 5 ETC.) =>
        ";N
28 180 IF N < 5 THEN PRINT "5 X 5 IS THE SMAL
       LEST SIZE!": GOTO 170
5F 190 IF N > 15 THEN PRINT "15 X 15 IS THE L
       ARGEST SIZE!": PRINT : GOTO 170
DA 200 DIM A$(N,N),W$(N),V$(40)
CE 210 FOR A = 1 TO N: FOR B = 1 TO N:A$(A,B)
        = "*": NEXT B,A
AD 220 PRINT : PRINT : INPUT "NAME OF PUZZLE
       => ";N$
12 230 HOME : VTAB (5): PRINT A$
FB 240 PRINT "     COMMANDS": PRINT
E3 250 PRINT : PRINT "P = PRINT PUZZLE": PRIN
       T "V = VIEW PUZZLE"
1A 260 PRINT "N = START NEW PUZZLE": PRINT "W
        = SHOW WORD LIST SO FAR"
55 270 PRINT "Q = QUIT PROGRAM": PRINT
CF 280 PRINT "NEXT WORD OR COMMAND: ";:W$ = "
       "
A7 290 GET JF$: IF ASC (JF$) = 13 THEN 330
57 291 IF ASC (JF$) = 8 THEN 293
A6 292 GOTO 300
EC 293 IF LEN (W$) = 0 THEN 290
6C 294 IF LEN (W$) = 1 THEN W$ = "": PRINT JF
       $;: PRINT " ";: PRINT JF$;: GOTO 290
78 295 W$ = LEFT$ (W$, LEN (W$) - 1): PRINT J
       F$;: PRINT " ";: PRINT JF$;: GOTO 290
6E 300 IF JF$ > "Z" THEN JF$ = CHR$ ( ASC (JF
       $) - 32)
7B 310 IF JF$ < "A" OR JF$ > "Z" THEN 290
18 320 PRINT JF$;:W$ = W$ + JF$: GOTO 290
1F 330 PRINT : IF LEN (W$) > N THEN PRINT "WO
       RD CANNOT EXCEED "N" LETTERS!": PRINT
       : GOTO 280
FC 340 IF W$ = "N" THEN 580
5D 350 IF W$ = "P" THEN GOSUB 810:A$ = "FINIS
       HED": GOTO 230
0E 360 IF W$ = "V" THEN GOSUB 620: GOSUB 660:
       A$ = "": GOTO 230
E2 370 IF W$ = "W" THEN GOSUB 780: GOSUB 660:
       A$ = "": GOTO 230
0F 380 IF W$ = "Q" THEN END :A$ = "": GOTO 23
       0
ED 390 IF LEN (W$) < 2 THEN PRINT "WORDS MUST
        BE TWO OR MORE LETTERS": GOTO 280
2C 400 L = LEN (W$): FOR I = 1 TO L:W$(I - 1)
        = MID$ (W$,I,1): NEXT I:L = L - 1
52 410 GOSUB 680
DA 420 GOSUB 700:F = 0:F1 = 0:F2 = 0: GOSUB 9
       00
6F 430 FOR I = A1 TO A2: FOR J = B1 TO B2
CB 440 F = 0: FOR K = 0 TO L:X = I + K * V1:Y
        = J + K * W1
4C 450 IF A$(X,Y) = "*" THEN F = F + 1: GOTO
       480
4B 460 IF A$(X,Y) = W$(K) THEN F = F + 2: GOT
       O 480
FA 470 F = 0:K = L
F1 480 NEXT K
E4 490 IF F > F1 THEN GOSUB 730
A2 500 NEXT J,I
CC 510 IF F2 THEN GOSUB 740: GOTO 230
A2 520 V1 = V1 + 1: IF V1 = 2 THEN V1 = - 1
0C 530 IF V1 = - 1 THEN W1 = W1 + 1: IF W1 =
       2 THEN W1 = - 1
AA 540 IF (W1 = 0) AND (V1 = 0) THEN V1 = 1
BC 550 IF (V1 < > V) OR (W1 < > W) THEN GOSUB
        700: GOTO 430
64 560 A$ = W$ + " WILL NOT FIT IN THE PUZZLE
       .          TRY A NEW WORD."
20 570 GOTO 230
26 580 HOME : VTAB (5): HTAB (5): PRINT "ARE
       YOU SURE (Y/N) ?";
E3 590 GET A$
40 600 IF A$ = "Y" OR A$ = "y" THEN RUN
AF 610 A$ = "": GOTO 230
AD 620 HOME : PRINT "      "N$" SOLUTION": PR
       INT
72 630 FOR B = 1 TO N: FOR A = 1 TO N
06 640 PRINT A$(A,B)" ";: NEXT A: PRINT : NEX
       T B
20 650 RETURN
69 660 PRINT "PRESS ANY KEY TO CONTINUE ";
6A 670 GET A$: RETURN
1E 680 V = INT (3 * RND (3) - 1):W = INT (3 *
        RND (3) - 1): IF (W = 0) AND (V = 0)
       THEN V = 1
13 690 V1 = V:W1 = W: RETURN
81 700 A1 = 1 + L * (V1 < 0):B1 = 1 + L * (W1
        < 0)
42 710 A2 = N - L * (V1 > 0):B2 = N - L * (W1
        > 0)
09 720 A3 = INT (A1 + (A2 - A1) * RND (3)):B3
        = INT (B1 + (B2 - B1) * RND (3)): RET
       URN
21 730 A3 = I:B3 = J:F2 = 1:F1 = F: RETURN
79 740 FOR K = 0 TO L:X = A3 + K * V1:Y = B3
       + K * W1
E6 750 A$(X,Y) = W$(K): NEXT K
96 760 C = C + 1:V$(C) = W$: IF C = 40 THEN A
       $ = "PUZZLE FULL! NO MORE ROOM": RETUR
       N
34 770 A$ = W$ + " ADDED TO PUZZLE": RETURN
F1 780 HOME : PRINT TAB( 20 - .5 * LEN (N$))N
       $: PRINT : PRINT "WORD LIST ": PRINT
E6 790 FOR I = 1 TO C STEP 2: PRINT V$(I) SPC
       ( 20 - LEN (V$(I)))V$(I + 1): NEXT I:
       PRINT : PRINT : PRINT
18 800 RETURN
49 810 PRINT CHR$ (4)"PR#1"
59 820 GOSUB 780
8A 830 FOR B = 1 TO N: PRINT TAB( 20);: FOR A
        = 1 TO N
AB 840 IF A$(A,B) = "*" THEN PRINT CHR$ ( RND
        (3) * 26 + 65);" ";: GOTO 860
EF 850 PRINT A$(A,B);" ";
61 860 NEXT A: PRINT : NEXT B
AA 870 PRINT : PRINT : PRINT : PRINT
4F 880 PRINT CHR$ (4)"PR#0"
2A 890 RETURN
3D 900 FOR K = 0 TO L
82 910 X = A3 + K * V1:Y = B3 + K * W1
0B 920 IF A$(X,Y) = "*" THEN F = F + 1: GOTO
       950
49 930 IF A$(X,Y) = W$(K) THEN F = F + 2: GOT
       O 950
F9 940 F = 0:K = L
F0 950 NEXT K
4D 960 IF F > F1 THEN F1 = F:F2 = 1
27 970 RETURN
```

aa

Three-Way Picture Printer for the ImageWriter

Mike Dorffler

Print out your favorite hi-res creations in three different sizes with this fast and easy-to-use printer program. Requires an ImageWriter and a super-serial card.

Your hi-res pictures look great on your monochrome or color monitor. But you're not satisfied with the simple pleasures of life; you want more. Maybe you're tired of lugging your Apple II around just to show off your hi-res pictures. Maybe you'd like to send out a few postcards and include samples of your best graphics. Maybe you'd like to turn your pictures into miniposters.

With the program presented here, "Three-Way Picture Printer," you can take your hi-res pictures and print a small image that's just the right size for pasting onto a postcard, print a regular-sized image that takes up most of a page, or print a large image that's nearly four pages in size.

Picture Yourself Typing

To use Three-Way Picture Printer, you'll need to enter and save Programs 1 and 2. Program 1 is written in BASIC. Accurate typing is important here, so be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, when typing in Program 1. Save this program as PRINT.

Program 2 contains the subroutines that are called from within the BASIC program. You'll need to enter this listing using "Apple MLX," the machine language entry program found elsewhere in this issue. When you run Apple MLX, you'll be asked for the starting and ending addresses of the program that you're about to enter. When MLX prompts you, respond with the values given below for Program 2.

```
STARTING ADDRESS?  8000
ENDING ADDRESS?    8227
```

After Apple MLX has displayed the options menu, choose E to enter the program, and then type in your starting address. (If you're just beginning to enter Program 2, type **8000**, the first address in the listing.) Enter the data and then save the file with the filename PRINT.ML to the same disk that contains Program 1.

Note: It's very important that you save this file as PRINT.ML; Program 1 expects to find Program 2 saved with that filename.

From Screen to Printer

Three-Way Picture Printer is menu-driven and designed to be self-explanatory. The first screen presents a menu with options for changing the disk drive; cataloging a disk; loading a hi-res picture; printing a small, regular, or large picture; or quitting the program. To make a selection, use the up- and down-arrow keys to highlight the desired option; then press Return.

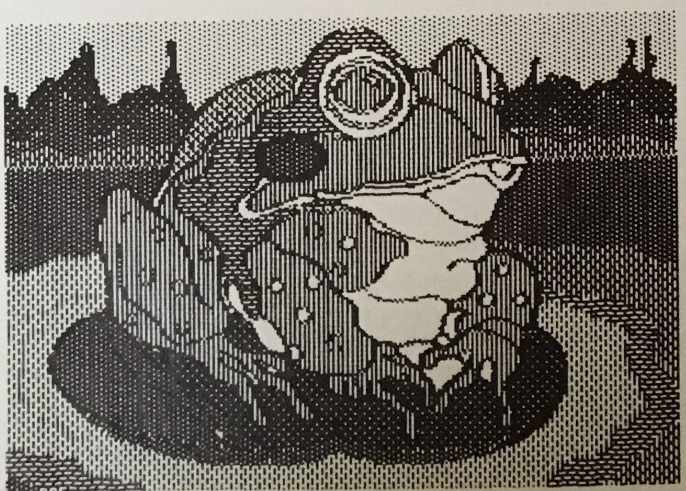
Before you can print a hi-res picture, you must first load the picture into memory. To do this, select LOAD HI-RES PICTURE, the first item on the menu. When the computer prompts you, type in the filename and press Return. If you can't remember the filename, press Return to go back to the first screen and select CATALOG DISK. If you have more than one disk drive, you can choose CHANGE DISK DRIVE to toggle between drive 1 and drive 2.

After a picture has been loaded with LOAD HI-RES PICTURE, the program displays the picture on the screen; then you're given the option to load another picture. When you've found the picture you want to print, answer **N** to the LOAD ANOTHER PICTURE prompt and you'll return to the first screen. From there you have the choice of three print sizes. The smaller size (2⅝ × 3⅞ inches) is just right for pasting onto ordinary postcards for personalized Mail-o-Grams. The regular size (5⅜ × 7¾ inches) is perfect for keeping a record of your graphics files in a notebook, and the large size (10¾ × 15½ inches) produces miniposters. The small and regular-sized printouts require one sheet of paper. The large, miniposter-sized printouts require four sheets, which you'll need to trim, match, and tape together. All three sizes automatically add the filename to the lower left corner of the picture before a form feed advances the paper for another printout.

While the program doesn't print in color, you can get interesting results with colored ribbons, colored paper, or a combination of both. Fresh ribbons are recommended for the best picture quality, though older ribbons will produce good results.

This amphibious graphic has been printed using the Small option in "Three-Way Picture Printer."

Before . . .



. . . and after.

How It Works

PRINT.ML contains a total of nine subroutines, which are called from within the BASIC program. It also creates four hi-res lookup tables in memory. These tables are required for program speed and contain hi-res screen addresses and a special screen byte converter.

The machine language routines convert the 40 vertical hi-res picture columns, one at a time, to character strings. These strings are then downloaded into the ImageWriter's auxiliary memory. In the BASIC program, the PRINT PR$ tells the printer to print the strings in auxiliary memory instead of using the normal character set.

Be sure that you carefully type in each of the program's printer-command strings located in lines 570 and 690 of Program 1; otherwise, you'll have printer errors. These commands control dot spacing for correct picture proportioning, printer memory control, and other key printer elements. Modifying the program in any way is not recommended. Line 960 contains a string that enables near-letter-quality mode on newer ImageWriters and ImageWriter IIs. If your ImageWriter supports near-letter-quality mode, you can remove the REM at the beginning of this line for a darker-looking printout.

When the above routines are used to reproduce hi-res pictures, the ImageWriter's memory becomes scrambled. When you exit the program, you're instructed to turn the printer off and on again before using it for other tasks. This action resets all printer commands to their default settings.

Program 1: PRINT

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```
E9 10 REM COPYRIGHT 1989 COMPUTE! PUBLICATION
      S, INC. - ALL RIGHTS RESERVED
D3 30 HIMEM: 31744
60 40 TEXT : HOME : PRINT CHR$ (21):DR = 1:C$
       = "CATALOG,S6,D":SYSTEM = 43624: IF PE
      EK (48896) = 76 THEN SYSTEM = 48701:C$
      = "CAT,S6,D"
51 50 POKE SYSTEM,1: VTAB 3: HTAB 9: PRINT CH
      R$ (21);"3-WAY PICTURE PRINTER"
4B 55 VTAB 8: HTAB 13: PRINT "COPYRIGHT 1989"
      : HTAB 7: PRINT "COMPUTE! PUBLICATIONS,
       INC.": HTAB 10: PRINT "ALL RIGHTS RESE
      RVED."
7D 60 POKE 230,32: CALL - 3086:P$ = "PRINT.ML
      "
46 70 ONERR GOTO 790
BD 80 PRINT : PRINT CHR$ (4);"BRUN PRINT.ML":
       GOSUB 880
D9 90 REM MENU
8E 100 T = 1
65 110 TEXT : HOME : VTAB 4: PRINT "--------
      3-WAY PICTURE PRINTER --------": VTAB
      6: HTAB 14: PRINT "FUNCTION MENU:": VT
```

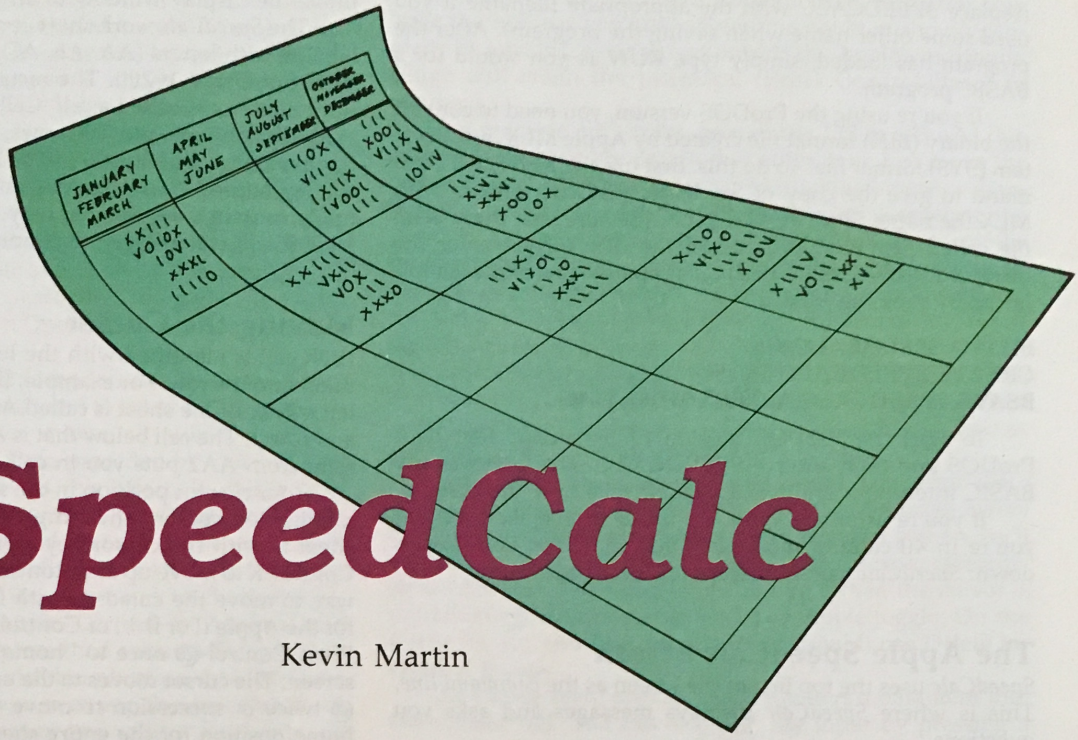
```
      AB 12: HTAB 22: PRINT DR
5A 120 VTAB 18: PRINT "  USE ARROW KEYS AND <
      RETURN> TO SELECT": FOR J = 1 TO 7: VT
      AB VM(J): HTAB HM(J): PRINT M$(J): NEX
      T : GOSUB 200
5A 130 GOSUB 210: IF K = 136 OR K = 139 THEN
      GOSUB 190
75 140 IF K = 149 OR K = 138 THEN GOSUB 170
12 150 IF K < > 141 THEN 130
2B 160 ON T GOTO 290,410,410,410,230,260,720
4D 170 VTAB VM(T): HTAB HM(T): PRINT M$(T):T
      = T + 1: IF T = 8 THEN T = 1
1B 180 GOTO 200
41 190 VTAB VM(T): HTAB HM(T): PRINT M$(T):T
      = T - 1: IF T = 0 THEN T = 7
56 200 VTAB VM(T): HTAB HM(T): INVERSE : PRIN
      T M$(T): NORMAL : RETURN
43 210 REM GET KEYPRESS
B6 220 WAIT 49152,128:K = PEEK (49152): POKE
      49168,0: RETURN
90 230 REM CHANGE DISK DRIVE
DE 240 DR = DR + 1: IF DR = 3 THEN DR = 1
D3 250 VTAB 12: HTAB 22: PRINT DR: GOTO 130
A8 260 REM CATALOG DISK
3F 270 ONERR GOTO 790
75 280 HOME : PRINT : PRINT CHR$ (4);C$;DR: P
      RINT : PRINT " <PRESS A KEY>": GOSUB 2
      10: GOTO 110
41 290 REM LOAD HI-RES PICTURE
15 300 CALL - 3100
93 310 VTAB 19: HTAB 1: CALL - 958
B6 320 VTAB 21: PRINT "PRESS <RETURN> WITHOUT
       ENTRY TO CANCEL"
30 330 INPUT "FILE NAME? ";P$: IF P$ = "" THE
      N P$ = "PICTURE": VTAB 19: HTAB 1: CAL
      L - 958: GOTO 110
3A 340 ONERR GOTO 790
1E 350 PRINT CHR$ (4);"BLOAD";P$;",A$4000,D";
      DR: POKE 49234,0: CALL 32780: FOR Q =
      1 TO 1500: NEXT : POKE 49235,0
16 360 VTAB 21: HTAB 1: CALL - 958
B1 370 VTAB 22: HTAB 8: PRINT "LOAD ANOTHER F
      ILE? <Y/N>": VTAB 22: HTAB 25: FLASH :
       PRINT "?": NORMAL
EF 380 GOSUB 210: IF K < > 206 AND K < > 217
      THEN 380
4E 390 IF K = 217 THEN 310
54 400 VTAB 22: HTAB 1: CALL - 868: GOTO 110
5B 410 REM PRINT PICTURE ROUTINE
19 420 VTAB 21: HTAB 1: CALL - 958: CALL - 31
      00
ED 430 VTAB 22: HTAB 7: PRINT "PRINT THIS PIC
      TURE? <Y/N>": VTAB 22: HTAB 25: FLASH
      : PRINT "?": NORMAL
DA 440 GOSUB 210: IF K < > 206 AND K < > 217
      THEN 440
08 450 VTAB 21: HTAB 1: CALL - 958: IF K = 20
      6 THEN 110
CD 460 REM PRINTER REMINDER
CC 470 CALL - 198
73 480 VTAB 22: HTAB 8: PRINT "PLEASE TURN ON
       PRINTER": HTAB 4: PRINT "ALIGN PAPER
      WITH CLEAR TEAR EDGE": HTAB 3: PRINT "
      <RETURN> TO PRINT - <ESC> TO ABORT";
B6 490 GOSUB 210: IF K < > 155 AND K < > 141
      THEN 490
3D 500 IF K = 155 THEN 110
7D 510 POKE 49234,0: PRINT : PRINT CHR$ (4);"
      PR#1"
8E 520 PRINT : PRINT QL$;WD$;LM$;LF$
E0 530 IF T = 4 THEN 620
13 540 IF T = 3 THEN 580
79 550 REM PRINT SMALL PICTURE
D4 560 FOR S = 0 TO 39: POKE 5,S: PRINT DL$;:
       CALL 32795
9B 570 PRINT PR$;: PRINT "0123456789:;<=>?@AB
      CDEFG": NEXT : GOTO 700
2B 580 REM PRINT REGULAR PICTURE
37 590 FOR S = 0 TO 39: POKE 5,S: CALL 32771
65 600 PRINT DL$;: CALL 32774: PRINT PR$;: GO
      SUB 690
F8 610 PRINT DL$;: CALL 32777: PRINT PR$;: GO
      SUB 690: NEXT : GOTO 700
D8 620 REM PRINT LARGE PICTURE
20 630 FOR Q = 1 TO 4:U = (Q * 3) + 32780: CA
      LL U
2E 640 FOR S = 0 TO 39: POKE 5,S: CALL 32771
6F 650 PRINT DL$;: CALL 32774: PRINT PR$;: GO
      SUB 690
D8 660 PRINT DL$;: CALL 32777: PRINT PR$;: GO
      SUB 690: NEXT
C0 670 IF Q = 2 THEN PRINT CHR$ (12)
2A 680 NEXT : CALL 32780: GOTO 700
66 690 PRINT "0123456789:;<=>?@ABCDEFGHIJKLMN
      OPQRSTUVWXYZ[\]^_": RETURN
9D 700 PRINT : PRINT ROM$: PRINT P$: PRINT CH
      R$ (12): REM FORM FEED
B7 710 PRINT : PRINT CHR$ (4);"PR#0": GOTO 11
      0
77 720 REM PRINTER EXIT NOTES, EXIT PROGRAM
BD 730 VTAB 19: HTAB 1: CALL - 958: VTAB 21:
      PRINT "  ARE YOU SURE YOU WANT TO QUIT
      ? <Y/N>": VTAB 21: HTAB 32: FLASH : PR
      INT "?": NORMAL
E3 740 GOSUB 210: IF K < > 206 AND K < > 217
      THEN 740
DF 750 IF K = 206 THEN VTAB 19: HTAB 1: CALL
      - 958: GOTO 110
4F 760 TEXT : HOME : VTAB 8: HTAB 2: PRINT "P
      LEASE NOTE;": VTAB 10: HTAB 2: PRINT "
      PRINTER MEMORY MUST BE CLEARED.": PRIN
      T
F0 770 HTAB 2: PRINT "BEFORE FURTHER PRINTER
      USE,": HTAB 2: PRINT "TURN PRINTER OFF
      , WAIT 15 SECONDS,": HTAB 2: PRINT "TH
      EN TURN ON AGAIN."
8C 780 POKE SYSTEM,1: VTAB 22: END
6F 790 REM ONERR ROUTINE
A4 800 CALL - 198:E = PEEK (222):EL = PEEK (2
      18) + 256 * PEEK (219): CALL - 3288: P
      OKE 216,0
78 810 E$ = "OOPS, ERROR IN LINE " + STR$ (EL
      )
45 820 IF E = 6 THEN E$ = "CANNOT LOAD " + P$
D0 830 IF E = 8 THEN E$ = "OOPS, DISK PROBLEM
      "
CB 840 TEXT : HOME : VTAB 22: PRINT E$: PRINT
       "<RETURN> TO TRY AGAIN - <ESC> TO QUI
      T"
AA 850 GOSUB 210: IF K < > 155 AND K < > 141
      THEN 850
61 860 IF K = 141 THEN HOME : GOTO 110
97 870 TEXT : HOME : POKE SYSTEM,1: VTAB 22:
      END
5B 880 REM DEFINE PRINTER COMMANDS AND MENU S
      TRINGS
08 890 REM TYPE IN THE FOLLOWING LINES CAREFU
      LLY!!
1A 900 ESC$ = CHR$ (27):WD$ = ESC$ + "T14": R
      EM PRINTER LINE SPACING
BC 910 LM$ = ESC$ + "L016": REM SET LEFT MARG
      IN
4F 920 LF$ = ESC$ + CHR$ (114) + CHR$ (31) +
      "8" + ESC$ + CHR$ (102)
9E 930 DL$ = ESC$ + CHR$ (45) + ESC$ + CHR$ (
      73): REM DOWNLOAD COMMAND
A3 940 PR$ = ESC$ + CHR$ (39) + ESC$ + CHR$ (
      110): REM PRINT DOWNLOAD
8C 950 ROM$ = ESC$ + CHR$ (36) + ESC$ + CHR$
      (45) + ESC$ + CHR$ (80)
60 960 REM QL$ = ESC$ + CHR$ (97) + CHR$ (50)
      : REM PRINT LETTER QUALITY
FF 970 DIM M$(7),VM(7),HM(7)
A2 980 FOR J = 1 TO 7: READ M$(J),VM(J),HM(J)
      : NEXT : RETURN
0B 990 DATA LOAD HI-RES PICTURE,8,4
8A 1000 DATA PRINT SMALL PICTURE,9,4
68 1010 DATA PRINT REGULAR PICTURE,10,4
42 1020 DATA PRINT LARGE PICTURE,11,4
CA 1030 DATA CHANGE DISK DRIVE,12,4,CATALOG D
      ISK,13,4
8A 1040 DATA QUIT,14,4
```

Program 2: PRINT.ML

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```
8000: 4C 1E 80 4C 2B 81 4C 8D 09
8008: 81 4C 93 81 4C 0D 82 4C 4F
8010: A4 80 4C B2 80 4C C0 80 6F
8018: 4C CE 80 4C D5 81 A9 20 EF
8020: 85 E6 A2 00 86 06 8A A0 F3
8028: 00 A2 00 20 11 F4 A6 06 83
8030: A5 27 9D 00 83 A5 26 9D 1E
8038: C0 83 E8 86 06 E0 C0 D0 06
8040: E5 A0 FF A2 0F BD 72 80 5B
8048: 99 00 85 88 C0 FF F0 05 3C
8050: CA 10 F2 30 EE A9 01 85 C1
8058: 27 A2 0F A9 07 85 26 BD 6A
8060: 82 80 99 00 86 88 C6 26 FF
8068: 10 F8 CA 10 EE C6 27 10 FA
8070: E8 60 7F 7C 73 70 4F 4C FD
8078: 43 40 3F 3C 33 30 0F 0C 5B
8080: 03 00 7F 7E 79 78 67 66 BD
8088: 61 60 1F 1E 19 18 07 06 55
8090: 01 00 18 BD 00 83 85 27 31
8098: 69 20 85 1B BD C0 83 85 36
80A0: 26 85 1A 60 A9 00 85 FB B3
80A8: A9 60 85 FC A9 13 85 FE BA
80B0: D0 28 A9 00 85 FB A9 60 29
80B8: 85 FC A9 27 85 FE D0 1A 47
80C0: A9 60 85 FB A9 C0 85 FC 77
80C8: A9 13 85 FE D0 0C A9 60 6E
80D0: 85 FB A9 C0 85 FC A9 27 6F
80D8: 85 FE A9 26 85 FD A5 FB 5F
80E0: 85 06 A9 00 85 07 A5 06 F4
80E8: AA 20 92 80 A4 FE B1 1A 40
80F0: AA BD 00 85 49 FF 85 F6 5B
80F8: BD 00 86 49 FF 85 F7 A9 ED
8100: 01 85 F4 A5 07 AA 20 92 93
8108: 80 A4 FD A5 F6 91 26 C8 A1
8110: A5 F7 91 26 E6 07 C6 F4 4E
8118: 10 E9 E6 06 A5 06 C5 FC A8
8120: D0 C4 C6 FE C6 FD C6 FD 3F
8128: 10 B4 60 A9 30 85 F5 A9 34
8130: BF 85 06 A9 00 8D BE 81 05
8138: 8D CA 81 A9 8A 8D BF 81 0B
8140: A9 8C 8D CB 81 A5 F5 20 58
8148: BD 81 20 C9 81 A9 48 20 8E
8150: BD 81 20 C9 81 A9 03 85 71
8158: F4 A5 06 AA 20 92 80 A4 9B
8160: 05 B1 26 AA BD 00 85 20 DA
8168: BD 81 20 BD 81 BD 00 86 14
8170: 20 C9 81 20 C9 81 C6 06 10
8178: C6 F4 10 DD E6 F5 A5 F5 4C
8180: C9 60 D0 C1 A9 FF 20 BD 02
8188: 81 20 C9 81 60 A9 8A 85 E9
8190: 27 D0 04 A9 8C 85 27 A9 E8
8198: 00 85 26 A0 00 B1 26 30 0F
81A0: 0B E6 26 D0 02 E6 27 20 CE
81A8: AE 81 10 EF A9 04 48 AD FF
81B0: 99 C0 49 10 29 30 D0 F7 7E
81B8: 68 8D 98 C0 60 8D 00 8A 36
81C0: EE BE 81 D0 03 EE BF 81 FC
81C8: 60 8D 00 8C EE CA 81 D0 9E
81D0: 03 EE CB 81 60 A9 30 85 32
81D8: F5 A9 BF 85 06 A5 F5 20 64
81E0: AE 81 A9 48 20 AE 81 A9 BD
81E8: 07 85 F4 A5 06 AA 20 92 77
81F0: 80 A4 05 B1 26 29 7F 49 37
81F8: 7F 20 AE 81 C6 06 C6 F4 82
8200: 10 E9 E6 F5 A5 F5 C9 48 A4
8208: D0 D3 4C AC 81 A2 00 20 75
8210: 92 80 A0 27 B1 1A 91 26 44
8218: 88 10 F9 E8 E0 C0 D0 EF CE
8220: 60 FF FF FF FF FF FF FF 55
```

aa



SpeedCalc

Kevin Martin

Written completely in machine language, this professional-quality program has all the important features you'd expect from a commercial spreadsheet. In addition, its data files can be merged into text files created with the Apple SpeedScript *word processor published last year in* COMPUTE!'s Apple Applications. *A printer is optional but recommended.*

Have you ever planned a budget for your home or office? If so, you probably used some sort of work sheet divided into rows and columns. Perhaps you wrote the months of the year along the top of the sheet and listed categories for earnings and expenses along one side. After entering data for each category and month of the year, you could calculate total income figures by adding or subtracting numbers in each of the sheet's cells.

That's a classic example of a work sheet. It lets you enter and organize data and then perform calculations that produce new information. A *spreadsheet* program is an electronic version of the familiar paper work sheet. Since it does all the calculations for you at lightning speed, an electronic spreadsheet is far more convenient than its paper counterpart. And spreadsheet programs also offer editing features that let you enter and manipulate large amounts of data with a minimum of effort.

Apple *SpeedCalc* is an all–machine language spreadsheet program for Apple II computers with either DOS 3.3 or ProDOS. Though relatively compact in size, *SpeedCalc* is fast and easy to use, and it has many of the features found in commercial spreadsheet programs. Even better, "*SpeedScript* File Converter" lets you merge your *SpeedCalc* files into word processing documents created with *SpeedScript*, COMPUTE!'s popular word processor (see *COMPUTE!'s Apple Applications*, Spring 1987, or *SpeedScript: The Word Processor for Apple Personal Computers*, published by COMPUTE! Books).

Working together, *SpeedCalc* and *SpeedScript* make a powerful team. You can merge a chart of sales figures into a company report, create a table of scientific data for a term paper, and manipulate numeric information in many other ways. In a sense, a spreadsheet program brings to arithmetic all of the flexibility and power that a word processor brings to writing.

Preparing the Program

Although Apple *SpeedCalc* is small in comparison to similar commercial programs, it's one of the longest programs COMPUTE! has ever published. Fortunately, "Apple MLX," the machine language entry utility, makes it easier to type in a program of this size. Be sure to carefully read the Apple MLX article elsewhere in this issue before you begin.

We're publishing two separate versions of Apple *SpeedCalc:* Program 1, for Apple computers with DOS 3.3, and Program 2, for Apples with ProDOS. Be sure to type the correct version for your system, since the DOS 3.3 version doesn't work with ProDOS, and vice versa.

Since the DOS 3.3 version of *SpeedCalc* resides in the same area of memory normally used by BASIC programs, you must relocate the BASIC program storage area *before* loading MLX to enter the data for *SpeedCalc*. If you're using DOS 3.3, enter the line below in direct mode (without a line number) and press Return:

POKE 104,38:POKE 9728,0:NEW

Then load and run MLX.

If you're using ProDOS, no special actions are required before you load and run MLX.

Here are the addresses you need to enter *SpeedCalc* with Apple MLX:

DOS 3.3
Starting address: 07FA
Ending address: 24F9

ProDOS
Starting address: 2000
Ending address: 3D67

After you've finished typing, be sure to save at least one copy before attempting to run *SpeedCalc* for the first time. To start the DOS 3.3 version, first enter **BLOAD SPEEDCALC** (replace SPEEDCALC with the appropriate filename if you used some other name when saving the program). After the program has loaded, simply type **RUN** as you would for a BASIC program.

If you're using the ProDOS version, you need to convert the binary (BIN) format file created by Apple MLX into a system (SYS) format file. To do this, first use the RENAME command to give the copy of *SpeedCalc* that you entered with MLX the name SPEEDCALC.MLX. (Be sure that there is no file called just SPEEDCALC on the disk.) Then enter the three commands below, each on a separate line and each followed by pressing Return:

```
BLOAD SPEEDCALC.MLX
CREATE SPEEDCALC,TSYS
BSAVE SPEEDCALC,A$2000,E$3D67,TSYS
```

To start the ProDOS version of *SpeedCalc*, first boot ProDOS and then enter **−SPEEDCALC**. This removes the BASIC interpreter and lets *SpeedCalc* take over the system.

If you're using an Apple IIe, IIc, or IIGS, make sure that you're in 40-column mode and that the Caps Lock key is down: *SpeedCalc* doesn't accept lowercase-text input.

The Apple SpeedCalc Screen

SpeedCalc uses the top line of the screen as the *command line*. This is where *SpeedCalc* displays messages and asks you questions.

Screen lines 2–4 are the *input buffer* area. This is the work area where you enter and edit data. As you'll see in a moment, the input buffer also displays the data contained in the current cell. The work-area cursor is an inverse less-than symbol (<). When the cursor is solid (nonblinking), *SpeedCalc* is waiting for a command or for data to be entered. After a character of data has been entered, the cursor begins blinking. While the cursor is blinking, most *SpeedCalc* commands (except for the cursor-movement keys) are deactivated until you press Return to enter the data into the work sheet.

The lower 20 screen lines are your window into the spreadsheet. Though the spreadsheet contains many rows and columns, only a few can fit on the screen at one time. By scrolling the screen back and forth with the cursor, you can move the display window to any part of the spreadsheet.

The *SpeedCalc* work sheet consists of 50 vertical columns labeled with letters (AA, AB, AC . . . BX) and 200 horizontal rows numbered 1–200. The rectangle where a row and column intersect is called a *cell*. Cells are where you store data. With 50 columns and 200 rows, the *SpeedCalc* spreadsheet has a maximum of 10,000 (50 × 200) cells. Because of memory limitations, however, only about a third of these can actually contain data. But you may spread out the data over all 10,000 cells if necessary, depending on the format you need.

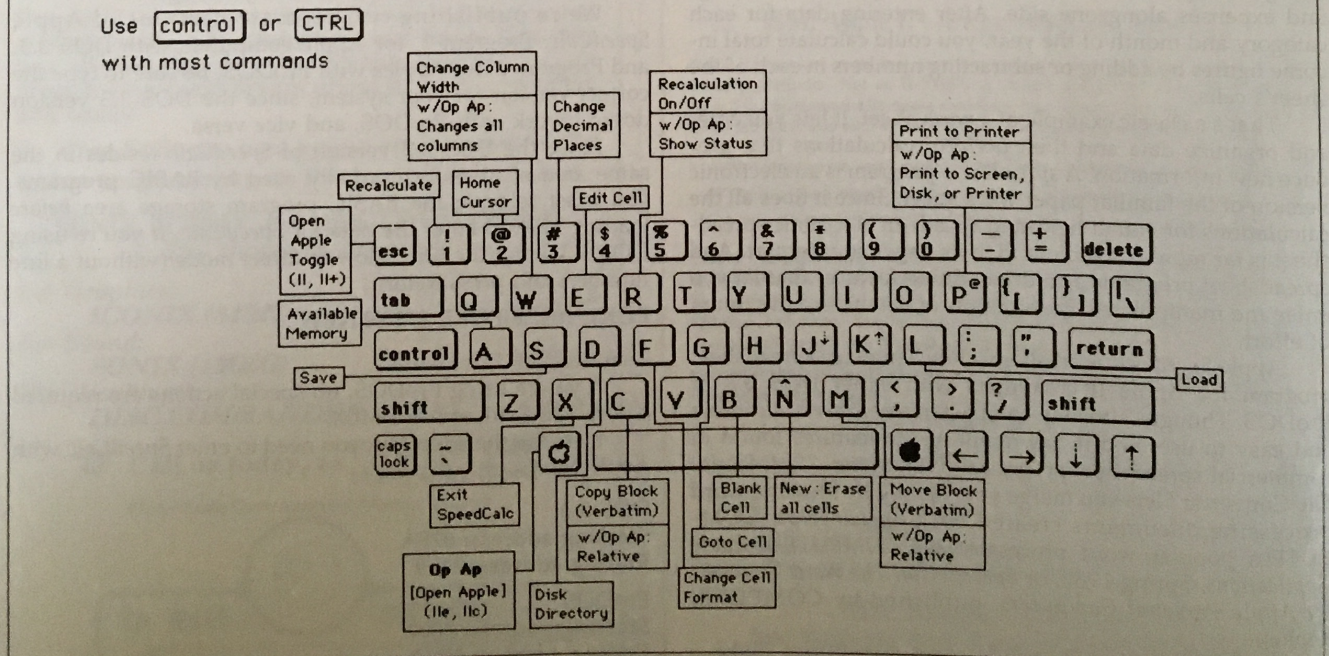
Moving the Cursor

Each cell is identified with the letters of its column and the number of its row. For example, the cell at the extreme upper left corner of the sheet is called AA1, since it's in column AA and row 1. The cell below that is AA2. Moving one cell to the right from AA2 puts you in cell AB2, and so on.

Your current position in the spreadsheet is shown by the highlighted cursor. The simplest way to move around the sheet is with the cursor keys (on the Apple II or II+, use Control-K to move up and Control-J to move down). Another way to move the cursor is with Control-@ (Control-Shift-P for the Apple II or II+, or Control-2 for the Apple IIe and IIc). Press Control-@ once to "home" the cursor on the current screen: The cursor moves to the upper left cell. Press Control-@ twice in succession to move the cursor to cell AA1, the home position for the entire sheet.

SpeedCalc also has a goto command for moving the cursor over long distances. When you press Control-G, the command line displays GOTO: followed by an underline cursor. The underline cursor generally indicates that *SpeedCalc* is waiting for data—in this case, the name of the cell where you wish to go. If you enter **BA188** at this point, *SpeedCalc* moves the cursor to the cell at column BA in row 188, adjusting the screen window as needed. Take a few moments to practice moving around the spreadsheet with all three methods; you'll be using them a lot. In a later section, we'll discuss how to change the size and format of a cell.

SpeedCalc Keyboard Reference



Keyboard Commands

SpeedCalc offers many different commands, a few of which are entered by pressing one key. However, most commands are entered by pressing Control along with another key. Control-G, as you've seen, is the goto command. Control-A displays the amount of free memory available, and so on. The most drastic command is Control-X, which exits *SpeedCalc* and reboots the system with a PR#6 command. Since this effectively erases all data in memory, *SpeedCalc* prompts you with ARE YOU SURE Y/N? before it shuts down. To cancel the command, simply type *N* (or any other letter except Y).

A few commands require you to press three keys at once. This sounds more awkward than it is in practice, since two of the three keys are Open Apple and Control. For instance, the *relative copy* command is performed by pressing Open Apple–Control–C (hold down Open Apple and Control; then press C).

The older Apple II and II+ models don't have an Open Apple key, so Escape is programmed to act as an Open Apple toggle. Pressing Escape once makes all subsequent keypresses behave as if they've been preceded by Open Apple. Pressing Escape again turns off this effect. In this article, wherever the instructions call for the Open Apple key, Apple II and II+ owners should instead precede the keypress with Escape, then use Escape again afterward to disable the Open Apple toggle. For example, the command to check the recalculation status is Open Apple–Control–R; Apple II and II+ owners should instead press (and release) Escape, then press Control-R. There's no visible indication that the Open Apple toggle is in effect, so you must use Escape carefully or your keypresses will have unexpected results. For safety, always remember to press Escape again to toggle this function off after using a command that requires Open Apple. The table lists all the *SpeedCalc* commands, and the figure shows the keyboard layout with a description of what each key does. We'll be discussing each command in more detail below.

Three Data Types

Before entering any data, you must know what kind of data *SpeedCalc* accepts. There are three different types: numbers, text, and formulas. Let's look at each type in turn.

Numeric data consists of numbers—the basic stuff that spreadsheets work with. *SpeedCalc* has a few simple rules for numeric data: A number must be a decimal value (base 10, not hexadecimal) composed of one or more digits in the range 0–9, with an optional plus or minus sign. A decimal point is also optional. If you include any other characters in numeric input, *SpeedCalc* treats the entire input as text data (as explained below). Thus, the numbers 123, .001, and −65535 are valid numeric data. The number 65,535 is invalid because it includes a comma.

The allowable range for numbers in Apple *SpeedCalc* is the same as for Applesoft BASIC: roughly −1.7E38 to +1.7E38. If a calculation produces a number outside the allowable range, you'll see the message *ERROR* in the cell containing the formula. This doesn't happen very often, since *SpeedCalc* won't let you enter a number more than 36 digits long, and there's rarely a need to use such large numbers unless you're tracking the national debt.

Although an input value can be up to 36 digits long, numbers in *SpeedCalc* calculations are accurate only to 9 digits. This must be taken into account when you're doing any calculation involving large values. For example, you can enter the value 1122334455.66 into a cell and the cell will hold the value with no rounding. However, if you use the value from that cell in a formula, the value will be rounded to 9 digits—1122334460.00—and the result of the calculation is accurate only for the first 9 digits.

You can enter values in scientific notation by following a number with the letter *E* and the appropriate power of 10. For example, you can enter 1,234,000 as 1.234E06. However, *SpeedCalc* never uses scientific notation itself, no matter how large the number you enter. Scientific notation should generally be avoided, since values outside the Apple's maximum range will crash the program. (Press Control-Reset to recover.)

For example, let's enter the number 123 in cell AA1. No special commands are required to enter data: Just move the cursor to AA1 and begin typing. The blinking inverse < symbol shows the end of the data. While you're entering the number, it appears only in the input buffer near the top of the screen (the blinking underline shows your cursor position). As soon as you press Return, the number appears in AA1 and the letter *N* appears at the upper right of the screen. The *N* signifies *numeric*, meaning that *SpeedCalc* has accepted the entry as valid numeric data. Move the cursor to a vacant cell; then move it back to AA1. The input buffer displays whatever data is found in the cell under the cursor. When the current cell is empty, the buffer is empty as well.

If you want to change anything during data entry, press the Escape key. Escape always deletes the character before the cursor (or has no effect if the cell is empty). Later on, we'll explain how to edit existing data. Use Escape carefully; remember that when you're not editing (when the cursor is not blinking), Escape acts as an Open Apple toggle. On the Apple IIe, IIc, and IIGS, you can (and should) use Delete instead of Escape.

As you've seen, pressing Return enters a data item into the current cell. You can also end the input by pressing a cursor key. The data is entered as if you have pressed Return, and the cursor moves in the indicated direction. This feature is handy for entering a lot of data: Simply type the entry, move the cursor to the next cell, enter more data, and so on.

Text data. This isn't "data" in the strict sense, since *SpeedCalc* doesn't use it in calculations as it does numbers and formulas. Text data is there only to help people understand what the other data means. Text may consist of comments, titles, column headings, subheadings, or whatever you need to interpret the numbers and formulas. As an example, move the cursor to cell AA2 (just under AA1) and type the following line:

THIS IS A PIECE OF TEXT DATA.

You can use the Escape key (or Delete on the Apple IIe, IIc, and IIGS) to erase mistakes while you're typing. When you press Return, *SpeedCalc* displays *T* (for *text*) in the upper right corner. In this example, the cell isn't long enough to accept all the text, so only the leftmost portion appears in AA2. But, even though you can't see it, all of the text is there. Move the cursor to another cell; then move it back to AA2. As soon as you return to AA2, *SpeedCalc* displays all the text in the input buffer area.

Formula data is a mathematical expression or formula. It may be as simple as 2 + 2 or as complex as your imagination (and mathematical prowess) allows. The first character in a formula must always be an equal sign (=). If you omit this symbol, *SpeedCalc* either signals an error or treats the data as text.

The true power of a spreadsheet is that a formula in one cell can refer to another cell. This is easier to demonstrate than to explain. Move the cursor to cell AA3 and type the following line:

=AA1*25.01+@SQR(4)

As soon as you press Return, *SpeedCalc* displays *F* (for *formula*) in the upper right corner and puts the *result* of the formula (not the formula itself) in AA3. If AA1 contains 123, the value 3078.23 appears in AA3. In plain English, this formula means *Multiply the contents of cell AA1 by 25.01 and add*

the square root of 4.

Before we examine the formula more closely, here's a quick demonstration of what makes a spreadsheet such a powerful tool. Move the cursor back to AA1 and press Control-R. The command line displays the message RECALCULATION IS ON, meaning *SpeedCalc* will now automatically recalculate the entire sheet whenever you make a change. Now change the number in AA1 to 456 (simply move to the cell and start typing). The new result (11406.56) automatically appears in cell AA3. We'll explain more about automatic recalculation later.

Note that the referenced cell must contain data that *SpeedCalc* can evaluate: a number or another formula. If the formula refers to an empty cell, or one that contains text, *SpeedCalc* signals the error by printing *ERROR* in the cell containing the incorrect formula.

Mathematical Operators

These symbols can be used as *operators* in a formula:

Operator	Function
+	addition
−	subtraction
*	multiplication
/	division
^	exponentiation
=	equality

One factor that affects formulas is *precedence*, or the order in which mathematical operations are performed. In *SpeedCalc*, formula operators have the same precedence as in ordinary math.

The first operators to be evaluated—those with the highest precedence—are those enclosed in parentheses. Where one set of parentheses encloses another, the expression in the innermost set is evaluated first. The next operators to be evaluated are exponents. Multiplication and division have equal precedence; both operations are lower than exponentiation. Addition and subtraction have the lowest precedence of all. Operators of equal precedence are evaluated left to right. For example, *SpeedCalc* evaluates the formula **=5*(8+3*−2)^2−10/+2** as the value 15, just as in ordinary math. Note how the result is affected by the plus and minus signs before the two 2s.

Functions

Formulas may also include any of the functions listed here:

@ABS( )	absolute value
@ATN( )	arctangent
@AVE( )	average of a block of cells
@COS( )	cosine
@EXP( )	natural exponent
@INT( )	integer
@LOG( )	natural logarithm
@SGN( )	sign
@SIN( )	sine
@SQR( )	square root
@SUM( )	sum of a block of cells
@TAN( )	tangent
PI	value of pi (3.14159265)

All the functions except pi begin with the @ symbol and are followed by parentheses. The parentheses of a function may contain a number or formula. For example, the formula =@SQR(4) generates the square root of 4. The formula =@SQR(AA1) returns the square root of whatever value cell AA1 contains. Note that the *argument* (value within parentheses) of the functions @TAN( ), @SIN( ), and @COS( ) must be expressed in radians; the result of the function @ARC( ) is expressed in radians. The function @INT( ) generates an integer (whole number) by truncating (discarding the fractional part of) a numeric value; note that this is different from rounding.

The function @AVE( ) calculates the mean average of the values in a block (group) of cells. The function @SUM( ) calculates the sum of a block. Both functions require you to define the block so *SpeedCalc* knows which cells to include in the calculation. This is done by putting two cell names separated by a colon in the parentheses. The first cell name defines the upper left corner of the block, and the second defines the bottom right corner. For instance, =@AVE(AA1:AD20) calculates the average of all the cells from AA1 to AD20. The function =@SUM (AA1:AD20) calculates the sum of AA1 through AD20, and so on. An error results if any cell in the block is blank or contains text data.

Editing the Sheet

Editing is a very important spreadsheet function. The simplest way to change what a cell contains is to move to it and start typing. The old data in that cell is replaced by whatever you enter. For instance, to replace the contents of cell AA1 with the number 456, move to that cell, type 456, and press Return or exit with a cursor key. Press Control-B (think of *blank*) to erase what's in the current cell. To erase everything in the sheet, press Control-N (think of *new*). Before carrying out this drastic operation, *SpeedCalc* asks you to confirm it by pressing Y or N.

In some cases, only a minor change is needed. *Edit mode* lets you change the data in a cell without retyping the entire entry. To activate edit mode, move to the desired cell and press Control-E. In this mode, up and down cursor movement is disabled, and the left- and right-cursor keys move within the input buffer. Erase unwanted characters with the Escape key (the Delete key on the Apple IIe, IIc, and IIGS). Typing in edit mode inserts new characters in the line: Everything to the right of the new character moves right one space (unless the buffer is already full). Since the cursor keys have a different function in edit mode, you cannot use them to end the input. Press Return to enter the new data and escape from edit mode.

SpeedCalc displays *ERROR* in a cell when you enter an erroneous formula. Usually this means that you've made a typing error in that cell or that the formula refers to text or an empty cell. A line of asterisks (*********) signals that a number is too large to be printed in the cell. Though these messages appear in the cell area, no data is lost. You may move to the affected cell, view its contents in the input buffer, and make whatever correction is needed.

Recalculation

This feature is the very core of a spreadsheet. As you know, entering or editing a piece of data makes *SpeedCalc* perform a calculation and put the result in the cell under the cursor. In most cases, the new data relates to data in other cells, so you'll ultimately want to recalculate the entire spreadsheet as well. This can be done manually or automatically.

To recalculate the spreadsheet manually, enter an exclamation point (Shift-1). *SpeedCalc* begins at AA1 and recalculates every cell that contains data, placing fresh results wherever they're needed. If you switch to automatic recalculation mode, *SpeedCalc* automatically recalculates the entire spreadsheet each time you enter new data or edit what exists. When you press Control-R, *SpeedCalc* changes the recalculation status and displays it at the top of the screen. If automatic recalculation was turned off before, it is now on (and vice versa). If you aren't sure which mode you're in, press Open Apple–Control–R; *SpeedCalc* displays the mode without changing it.

Automatic recalculation can be fun to watch in a large

spreadsheet: Every time you make a change, new results appear everywhere on the screen. However, the more data your spreadsheet contains, the longer it takes to update the entire sheet. For this reason, you may want to turn off automatic recalculation most of the time, recalculating manually whenever you need to view results.

One problem with recalculation arises from the order in which cells are calculated. Because only one cell can be calculated at a time, you must sometimes recalculate the entire spreadsheet two or three times to get correct results in every cell (this is common to all spreadsheet programs). For instance, say you have a formula in AA1 which refers to a formula in AB15. When *SpeedCalc* calculates AA1, it must use the existing data from AB15—which is probably out of date, since the formula in AB15 hasn't been recalculated yet. To avoid this problem, you should always recalculate a sheet manually two or three times before printing or saving it to disk.

SpeedCalc offers a number of other features. Before experimenting with them, you should spend some time typing in a hypothetical spreadsheet—perhaps a fictitious yearly budget—to become thoroughly familiar with the basic commands covered so far. Most importantly, create formulas using all the operators in different combinations. Try doing things that you know will cause errors. Then correct the errors in edit mode, and so on. It takes a thorough grasp of the fundamentals to get the most from *SpeedCalc*'s advanced features.

Change Format

The default (normal) format for numeric data is flush right with rounding to two decimal places. In other words, the number is displayed in the rightmost part of the cell, with two numbers after the decimal point. Text and formulas are also displayed flush right. *SpeedCalc* offers several commands for changing cell formats. (Apple II and II+ owners who are using the Escape toggle in place of the Open Apple key should be careful that Escape is not in effect when it's not desired; accidental global changes may be difficult to reverse.)

Change Format (Control-F). This command changes the location of data in the cell. When you press Control-F, the *SpeedCalc* command line displays the question FORMAT: LEFT, CENTER, OR RIGHT JUSTIFY?. Press L, C, or R to move the data to the left, center, or right of the cell.

Change Decimal Places (#). *SpeedCalc* also lets you change the number of decimal places for any cell. The default number of decimal places is 2, but you may change it to anything in the range 0–15. Press # (Shift-3) to change this value: *SpeedCalc* prompts you to enter a number in the range 0–15. If you choose 0 decimal places, any number in that cell is rounded off to the nearest integer (whole number). If you choose 15 places, a number in that cell is not rounded off at all—*SpeedCalc* displays it exactly as you entered it or as it was calculated from a formula.

Width (Control-W). The width command changes the width of an entire column of cells. Move the cursor to any cell in the desired column and then press Control-W. When *SpeedCalc* displays the prompt WIDTH:, respond with a number in the range 4–36. The entire screen is redrawn to accommodate the new format and may look very different depending on what value you chose. For instance, if you increase a column's width, the rightmost column of the former display may disappear: *SpeedCalc* only displays as many complete columns as it can fit on the screen. If you decrease the width of a column, you may see asterisks where numbers used to be (indicating the cell is now too small to display the entire number). To get rid of the asterisks, expand the column as necessary.

Global Format (Open Apple-Control-F). This is the same as the ordinary format command, but it operates globally, changing every cell in the sheet instead of just one.

Global Width (Open Apple-Control-W). This is a global version of the width command. Every column in the sheet changes to the designated width.

Macro Editing

After you've typed in a large spreadsheet, you may decide to make a major change. You may want to add new data somewhere in the middle, to delete a section, or to move a group of cells from one location to another. *SpeedCalc*'s macro (large-scale) editing commands simplify such operations, affecting an entire block of cells at once. A *block* is simply a group of cells connected in rectangular fashion. You can define it as a single cell, a row or column, or any rectangular area within the spreadsheet.

There are two ways macro commands work: *verbatim* or *relative*. In a simple example, say that cell AA2 contains the formula =AA1*5 and you want to move its contents to cell AB2. When this is done in verbatim mode, AB2 contains an exact copy of what was in AA2 (=AA1*5). Note that the cell name used in the formula does not change: The formula still refers to AA1. If you perform the same operation in relative mode, the cell name in the formula is adjusted to fit the new location. In this case, AB2 will contain the formula =AB1*5. (Apple II and II+ owners who are using the Escape toggle in place of the Open Apple key should be careful that the toggle is not in effect when not desired; accidental relative changes can lead to problems that are difficult to detect and correct.)

Copy (Control-C). The copy command copies a block of cells into a different location without disturbing the original cells. Place the cursor on the upper left corner of the block you want to copy; then press Control-C. *SpeedCalc* prompts you to move the cursor to the lower right corner of the block you want to copy. Once the cursor is in place, press Return. Now *SpeedCalc* prompts you to move the cursor to the place where you want to put the block: This is the upper left corner of the new position. Once the cursor is there, press Return again. The new data replaces whatever was contained in the designated cells. Note that if you define an impossible block (for instance, moving the cursor to the upper left of the original position, rather than below and to the right), *SpeedCalc* does not copy any data. This provides a way to cancel the command if you press Control-C accidentally.

Move (Control-M). This command works like a copy, but it fills the original cells with blanks. Though *SpeedCalc* has no express insert command, you can use this command to make space for new data in the middle of a spreadsheet. Simply move everything below the insertion point as far as necessary.

Because Return generates the same character code that Control-M does, you may find when you first begin using *SpeedCalc* that you've accidentally invoked the move function by pressing Return when you shouldn't have. To cancel this, simply press Return twice more without moving the cursor.

Relative Copy (Open Apple-Control-C). This form of the copy command adjusts the cell names used in formulas within the copied block (see explanation above).

Relative Move (Open Apple-Control-M). This is the relative form of the move command. Cell names in formulas are adjusted to reflect the move.

Memory Management

The DOS 3.3 version of *SpeedCalc* makes about 12K (over 12,000 characters) of memory available for data; the ProDOS version provides approximately 17K. As noted earlier,

SpeedCalc lets you spread your data over a much larger number of cells than you can actually fill with data. The extra space is provided to give you full control over the final format of the spreadsheet and to leave some elbow room for move and copy operations.

Because memory is limited, you should keep careful track of how much is free while you're using the program. Press Control-A to display the amount of free memory. We suggest limiting your spreadsheets to 1600 cells (equivalent to 40 rows by 40 columns) when you're using the DOS 3.3 version, or to 2500 cells (a 50 × 50 work sheet) when you're using the ProDOS version. If you've filled nearly all of free memory, you may have to break the spreadsheet into two smaller sheets.

Although *SpeedCalc* checks the amount of available memory and displays an error message if you run out, you should be careful not to exhaust free memory. Any move or copy operation in process will be aborted if sufficient memory is not available.

Disk Operations

SpeedCalc has three disk commands that allow you to save a spreadsheet to disk, load it, and display the disk directory. The directory command is the simplest to use: Simply press Control-D. The spreadsheet disappears and a directory of the disk in drive 1 is displayed. Press Return to return to the spreadsheet.

To save a spreadsheet to disk, press Control-S. *SpeedCalc* prints SAVE: on the command line, followed by an underline cursor. Enter a valid Apple filename and press Return. (If you change your mind and decide not to save anything, press Return without typing a filename.) If no disk error occurs while the spreadsheet is being saved, *SpeedCalc* displays NO ERRORS in the command line and returns you to command mode. If there is an error, you'll hear a beep and see the message I/O ERROR in the command line.

To load a saved file from disk, press Control-L. Again, you can cancel the operation by pressing Return without entering a filename. *SpeedCalc* prompts you to enter the filename and displays the error status when the operation is complete.

When saving or loading *SpeedCalc* files with ProDOS, you must specify the prefix along with the name. If you don't want to type the prefix every time you enter a filename, simply call up a directory for the disk you want to use to save or load. This automatically sets the prefix to match the current disk, relieving you of the need to enter it with every name.

Printing

SpeedCalc lets you print data to three different devices: to the screen for previewing output, to a printer for permanent documentation, or to a disk file for integrating the data with a *SpeedScript* document.

To print a hardcopy of the spreadsheet to a printer in slot number 1, press Control-P. *Before using this command, you must position the cursor below and to the right of the block of cells you wish to print.* The upper left corner of the printout starts at cell AA1.

To send output to a printer with a slot number other than 1 (or to the screen or a disk), first position the cursor in the lower right corner of the block you want to print. Then press Open Apple–Control–P (toggle Escape on the Apple II and II+). *SpeedCalc* asks whether you want to print to the screen, to a disk, or to the printer. Press S to preview output on the screen, D to print to disk, or P to select printer output. Pressing any other key cancels the command.

If you select the P option after pressing Open Apple–Control–P, *SpeedCalc* asks you specify a slot number by pressing one of the number keys 1–7. This permits you to use a printer in any of those slots. If you change your mind at any point during this process, press Return without entering anything; *SpeedCalc* returns you to command mode.

You can also print *SpeedCalc* data to a disk file for use in a *SpeedScript* document. Select the D option after pressing Open Apple–Control–P; then enter a filename. The data is saved as a disk file of that name. Note that *printing* to disk creates a different type of file from what you'd use to *save* to disk, and *SpeedCalc* cannot reload files in the print format. You should *save* files you wish to reload into *SpeedCalc*, and *print* files you wish to convert for *SpeedScript*. Unlike the *SpeedCalc* save and load commands, a printing attempt generates no error messages if the spreadsheet cannot be printed to disk. Thus, you must ensure that the drive contains a write-enabled disk with sufficient space to hold the printed spreadsheet before you attempt to print to disk.

Program Key

Key	Function
Control-A	Available memory check
Control-B	Blank (erase) current cell
Control-C	Copy block verbatim
Control-D	Disk directory
Control-E	Edit current cell
Control-F	Change cell format
Control-G	Go to selected cell
Control-L	Load *SpeedCalc* file
Control-M	Move block verbatim
Control-N	New (erase entire sheet)
Control-P	Print file on printer
Control-R	Turn recalculation on/off
Control-S	Save *SpeedCalc* file
Control-W	Change column width
Control-X	Exit *SpeedCalc*
Control-@	Home cursor
Open Apple–Control–C	Copy block relative
Open Apple–Control–M	Move block relative
Open Apple–Control–P	Print to screen, disk, or printer
Open Apple–Control–R	Check recalculation status
Open Apple–Control–W	Change width of all columns
! (Shift-1)	Recalculate sheet
# (Shift-3)	Change decimal places

Note: The Apple II and II+ have no Open Apple key, so Escape must be used as an Open Apple toggle. Pressing Escape once makes all subsequent keypresses behave as if Open Apple is being pressed. Press Escape again to turn off the Open Apple toggle.

SpeedScript File Converter

SpeedCalc sends data to the printer in simple, plain-vanilla form. That may be fine for personal use, but if you're creating a document for others to view, you may want special features such as boldface, underlining, and so on. Since Apple *SpeedScript*—COMPUTE!'s popular word processor—already offers a way to access these features (and many more), no attempt has been made to include them in *SpeedCalc*. All that's needed is a simple program to convert *SpeedCalc* files into a form that *SpeedScript* can load. Then you can edit the file with *SpeedScript* as you would any other document—inserting printer control codes, reformatting the text, merging it with other text, and so on. "*SpeedScript* File Converter," published in the same issue with *SpeedScript*, makes it easy to perform the conversion. Here are the steps to follow to convert a *SpeedCalc* file for *SpeedScript*:

1. After you've created a spreadsheet with *SpeedCalc*, print it to disk as described above.
2. Exit *SpeedCalc*; then load and run *SpeedScript* File Converter. The program prompts you to enter the name of the

SpeedCalc file you printed to disk. Then it asks you to enter the name of the *SpeedScript* file you want to create (of course, this name should be different from the first). The File Converter then constructs a *SpeedScript*-loadable disk file from the *SpeedCalc* file.

3. After the File Converter has finished, load and BRUN *SpeedScript*. Then load the new *SpeedScript* file as you would any *SpeedScript* document. The data appears on the screen, ready to be edited in any way you wish.

Apple *SpeedCalc* for DOS 3.3

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```
Ø7FA: 2Ø 65 D6 4C D2 D7 ØØ ØA 12
Ø8Ø2: Ø8 ØA ØØ A5 AB 33 3Ø ØØ 7D
Ø8ØA: 14 Ø8 14 ØØ 8C 32 3Ø 38 6E
Ø812: 33 ØØ 1E Ø8 1E ØØ 8C 32 3C
Ø81A: 3Ø 38 3Ø ØØ ØØ ØØ 4C 4D 3C
Ø822: 22 2Ø 58 FC AD 61 CØ 8D 28
Ø82A: 59 25 A9 ØØ 8D F2 Ø3 A9 4D
Ø832: Ø9 8D F3 Ø3 49 A5 8D F4 C9
Ø83A: Ø3 A9 FD 85 39 85 37 A9 46
Ø842: 1B 85 38 A9 FØ 85 36 A9 96
Ø84A: 25 18 69 Ø1 8D FØ 24 18 CØ
Ø852: 69 4F 85 6C A9 ØØ 8D EF BA
Ø85A: 24 8D F1 24 85 6B 8D 69 BE
Ø862: 22 85 FF 8D 58 25 A9 A5 ØE
Ø86A: 8D F2 24 A9 Ø9 2Ø 61 Ø9 B1
Ø872: 2Ø D9 ØA A9 23 AØ 46 2Ø 2D
Ø87A: 3E Ø9 2Ø 88 ØD 2Ø 25 Ø9 B4
Ø882: 48 2Ø 7C Ø9 68 AE AC Ø8 3E
Ø88A: DD AC Ø8 FØ ØA CA DØ F8 DA
Ø892: C9 2Ø 9Ø E6 4C 37 ØC CA 32
Ø89A: 8A ØA AA A9 Ø8 48 A9 7B 92
Ø8A2: 48 BD D3 Ø8 48 BD D2 Ø8 28
Ø8AA: 48 6Ø 17 ØE ØØ 17 Ø6 Ø7 2A
Ø8B2: 1Ø Ø3 13 ØC 18 ØA ØB 15 C2
Ø8BA: Ø8 Ø2 Ø5 21 Ø1 12 Ø4 ØD 67
Ø8C2: 1B 23 ØD 31 32 33 34 35 D9
Ø8CA: 36 37 38 39 3Ø 2B 2D 2E 15
Ø8D2: C4 ØA DB 11 13 1Ø A8 ØC 8A
Ø8DA: 4E 11 32 14 ED 15 A2 19 FF
Ø8E2: 4Ø 1A D5 1E DD 1Ø F6 1Ø 63
Ø8EA: ØD 11 37 11 94 1C DB 1C A6
Ø8F2: Ø8 1C Ø3 1E A7 1C CC 1B B2
Ø8FA: C8 15 Ø8 Ø9 ED ØC 2Ø 58 7E
Ø9Ø2: FC 2Ø 22 ØB 4C 75 Ø8 AD 85
Ø9ØA: 58 25 49 FF 8D 58 25 6Ø 33
Ø912: 2C ØØ CØ 1Ø ØB AD ØØ CØ 23
Ø91A: 8D 1Ø CØ 29 7F C9 FF 6Ø 25
Ø922: A9 ØØ 6Ø A5 FF FØ Ø7 48 89
Ø92A: A9 ØØ 85 FF 68 6Ø 2Ø 12 D8
Ø932: Ø9 FØ FB 6Ø 2Ø F2 EB A5 D4
Ø93A: AØ A4 A1 6Ø 85 FC 84 FB 25
Ø942: 2Ø 6F Ø9 2Ø 8Ø FE A9 ØØ B6
Ø94A: 85 28 85 24 85 25 A9 Ø4 34
Ø952: 85 29 AØ ØØ B1 FB FØ Ø6 EA
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Ø962: 32 9D F6 24 CA DØ FA A9 4F
Ø96A: 28 8D 29 25 6Ø AØ ØØ A9 9A
Ø972: 2Ø 99 ØØ Ø4 C8 CØ 28 DØ A5
Ø97A: F6 6Ø AD Ø1 Ø4 C9 1Ø DØ 1E
Ø982: ØA AD ØA Ø4 C9 Ø2 FØ Ø3 C1
Ø98A: 4C 94 Ø9 A9 23 AØ 3C 2Ø D7
Ø992: 3E Ø9 38 2Ø C7 1F 9Ø Ø3 ED
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Ø9A2: 8D 8Ø Ø2 A9 3C 8D 81 Ø2 93
Ø9AA: A2 76 A9 AØ 9D 81 Ø2 CA AC
Ø9B2: DØ F8 AØ Ø1 DØ Ø2 AØ ØØ 5F
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Ø9C2: 99 8Ø Ø2 2Ø AB ØA 2Ø 12 DB
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Ø9D2: A9 DF 99 8Ø Ø2 4C C5 Ø9 C2
Ø9DA: AD 3C 25 99 8Ø Ø2 4C C5 7B
Ø9E2: Ø9 Ø9 8Ø 8D 3B 25 AD 3C AA
Ø9EA: 25 99 8Ø Ø2 AD 3B 25 AE 79
Ø9F2: 95 ØA DD 95 ØA FØ 2C CA 9E
Ø9FA: DØ F8 C9 AØ 9Ø BA 8C 3C BB
ØA02: 25 CE 3C 25 A2 77 BD 8Ø 25
ØA0A: Ø2 C9 3C FØ AB CA BD 8Ø AC
ØA12: Ø2 9D 81 Ø2 CA EC 3C 25 86
ØA1A: DØ F4 AD 3B 25 99 8Ø Ø2 CF
ØA22: C8 DØ 95 CA 8A ØA AA BD BD
ØA2A: 9E ØA 48 BD 9D ØA 48 6Ø FA
ØA32: AØ ØØ B9 8Ø Ø2 C9 3C FØ 76
ØA3A: Ø8 29 7F 99 ØØ Ø3 C8 DØ 94
ØA42: F1 A9 ØØ 99 ØØ Ø3 8C 2C A4
ØA4A: 25 6Ø AD 6A 22 FØ 2Ø CØ 3B
ØA52: ØØ FØ Ø1 88 4C BA Ø9 AD 58
ØA5A: 6A 22 FØ 13 B9 8Ø Ø2 C9 19
ØA62: 3C FØ F1 C8 4C BA Ø9 AD A8
ØA6A: 6A 22 FØ Ø3 4C BA Ø9 AD 97
ØA72: 3B 25 29 7F 85 FF 4C 32 81
ØA7A: ØA CØ ØØ FØ D7 88 98 AA 8F
ØA82: BD 81 Ø2 9D 8Ø Ø2 E8 C9 97
ØA8A: 3C DØ F5 A9 AØ 9D 8Ø Ø2 C8
ØA92: 4C BA Ø9 Ø7 8D 9B 8A 8B 88
ØA9A: 88 95 FF 31 ØA 7A ØA 68 22
ØAA2: ØA 68 ØA 4B ØA 58 ØA 7A ØC
ØAAA: ØA A2 ØØ BD 8Ø Ø2 9D 8Ø 1Ø
ØAB2: Ø4 BD A8 Ø2 9D ØØ Ø5 BD 22
ØABA: DØ Ø2 9D 8Ø Ø5 E8 EØ 28 29
ØAC2: DØ E9 6Ø A9 23 AØ 6Ø 2Ø DC
ØACA: 3E Ø9 2Ø 25 Ø9 C9 59 DØ 89
ØAD2: Ø3 2Ø D9 ØA 4C 7C Ø9 2Ø D2
ØADA: FA ØA A9 Ø9 2Ø 61 Ø9 2Ø 6D
ØAE2: 22 ØB 2Ø 88 ØD A9 2C 8D 4C
ØAEA: B4 22 A9 ØØ 8D B3 22 A5 3C
ØAF2: 6B 85 6F A5 6C 85 7Ø 6Ø 21
ØAFA: AD EF 24 85 FB AD FØ 24 5B
ØB02: 85 FC AØ ØØ 98 91 FB C8 F9
ØB0A: DØ FB E6 FC A6 FC EC F2 2A
ØB12: 24 DØ F2 A9 Ø1 8D F4 24 B3
ØB1A: 8D F5 24 85 1D 85 1E 6Ø EC
ØB22: 2Ø 28 ØB 4C B0 ØB AØ Ø5 7Ø
ØB2A: 8C 3B 25 B9 83 22 85 28 6D
ØB32: B9 6B 22 85 29 AØ ØØ AE 17
ØB3A: F5 24 A9 ØØ 8D 29 25 8D 72
ØB42: 2A 25 F8 AD 29 25 18 69 28
ØB4A: Ø1 8D 29 25 AD 2A 25 69 85
ØB52: ØØ 8D 2A 25 CA DØ EC D8 AF
ØB5A: A2 ØØ 2Ø 8D ØB F8 AD 29 5F
ØB62: 25 18 69 Ø1 8D 29 25 AD 57
ØB6A: 2A 25 69 ØØ 8D 2A 25 D8 44
ØB72: EE 3B 25 AC 3B 25 B9 83 A3
ØB7A: 22 85 28 B9 6B 22 85 29 BB
ØB82: AØ ØØ E8 EØ 12 DØ D3 2Ø AF
ØB8A: 8D ØB 6Ø AD 2A 25 18 69 9Ø
ØB92: 3Ø 91 28 C8 AD 29 25 29 3C
ØB9A: FØ 4A 4A 4A 4A 18 69 3Ø 5F
ØBA2: 91 28 C8 AD 29 25 29 ØF BE
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ØBBA: 85 29 AØ ØØ A9 2Ø 91 28 ØB
ØBC2: C8 91 28 C8 91 28 C8 AE AØ
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ØBD2: F6 24 8E 29 25 4A 69 ØØ F6
ØBDA: AA CA A9 2Ø 91 28 C8 CA B9
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ØBEA: B5 22 29 3F 91 28 C8 BD F9
ØBF2: B6 22 29 3F 91 28 C8 AE 73
ØBFA: 29 25 BD F6 24 4A AA CA 8Ø
ØC02: CA A9 2Ø 91 28 C8 CA 1Ø 11
ØC0A: FA AE 29 25 BD F6 24 18 EC
ØC12: 6D F3 24 8D F3 24 E8 BD FA
ØC1A: F6 24 18 6D F3 24 C9 25 79
ØC22: 9Ø AD CA 8E 32 25 A9 2Ø C9
ØC2A: CØ 28 DØ Ø1 6Ø 91 28 C8 39
ØC32: CØ 28 DØ F9 6Ø 2Ø AØ Ø9 3C
ØC3A: AD ØØ Ø3 FØ 3F C9 3D FØ 25
ØC42: 26 AE C4 Ø8 DD C4 Ø8 FØ 35
ØC4A: Ø7 CA DØ F8 A9 Ø1 DØ 19 4E
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ØC5A: ØØ A9 Ø3 2Ø 81 ØC 2Ø B7 73
ØC62: ØØ DØ E9 A9 ØØ FØ Ø2 A9 F7
ØC6A: Ø2 8D 2B 25 AD B4 22 8D BØ
ØC72: 2D 25 18 2Ø C7 1F 2Ø 27 91
ØC7A: 2Ø 2Ø Ø3 1C 4C 7C Ø8 85 B6
ØC82: B9 84 B8 2Ø B7 ØØ 4C 4A 52
ØC8A: EC A2 32 A9 ØØ 8D 38 25 6E
ØC92: BD F6 24 18 6D 38 25 8D 71
ØC9A: 38 25 C9 25 BØ Ø3 CA DØ 9B
ØCA2: EF E8 E8 8E 3C 25 6Ø A9 D3
ØCAA: ØØ 2C 59 25 3Ø Ø3 AD 61 95
ØCB2: CØ ØD 58 25 8D 57 25 AØ 8Ø
ØCBA: A5 A9 23 2Ø 3E Ø9 2Ø 25 F1
ØCC2: Ø9 C9 4C FØ ØF C9 43 FØ 81
ØCCA: ØF C9 52 FØ Ø3 4C 85 ØD 97
ØCD2: A2 ØC DØ Ø6 A2 Ø8 DØ Ø2 92
ØCDA: A2 Ø4 AD B4 22 29 FØ 8D 6B
ØCE2: 3B 25 8A ØD 3B 25 8D 3B C8
ØCEA: 25 4C 2F ØD A9 ØØ 2C 59 5E
ØCF2: 25 3Ø Ø3 AD 61 CØ ØD 58 65
ØCFA: 25 8D 57 25 AØ CE A9 23 FC
ØD02: 2Ø 3E Ø9 2Ø 76 1Ø FØ 7B 3Ø
ØD0A: AØ ØØ A9 Ø2 2Ø 81 ØC 2Ø Ø9
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ØD1A: BØ 69 AD B4 22 29 ØC 8D 43
ØD22: 3B 25 98 ØA ØA ØA ØA ØD 7Ø
ØD2A: 3B 25 8D 3B 25 AD 57 25 44
ØD32: 1Ø 41 AD 3B 25 8D B4 22 F8
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ØD42: 85 1C AØ Ø1 B1 1B FØ 11 37
ØD4A: 85 1A 88 B1 1B 85 19 B1 AC
ØD52: 19 29 Ø3 ØD B4 22 91 19 DE
ØD5A: C8 A5 1B 18 69 Ø2 85 1B AØ
ØD62: A5 1C 69 ØØ 85 1C A5 1C 87
ØD6A: C5 6C DØ D8 38 2Ø C7 1F 1B
ØD72: 4C 85 ØD 38 2Ø C7 1F 9Ø 28
ØD7A: ØA AØ ØØ AD 3B 25 ØD 2B 5Ø
ØD82: 25 91 19 4C 7C Ø9 A5 1D EB
ØD8A: 8D 3Ø 25 A5 1E 8D 31 25 25
ØD92: A9 Ø3 8D F3 24 AE F4 24 1D
ØD9A: 86 1D AC F5 24 84 1E 98 3C
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ØDAA: 24 8D 38 25 A9 FF EC 3Ø EA
ØDB2: 25 DØ Ø7 CC 31 25 DØ Ø2 Ø3
ØDBA: A9 3F 8D 33 25 98 18 69 83
ØDC2: Ø5 38 ED F5 24 A8 B9 6B 2D
ØDCA: 22 85 29 B9 83 22 85 28 EF
ØDD2: 38 2Ø C7 1F BØ Ø5 A9 AØ 89
ØDDA: 4C 67 ØE AD 2B 25 FØ 7Ø D1
ØDE2: C9 Ø2 FØ 6C AD 38 25 38 18
ØDEA: ED 2C 25 AA E8 3Ø 32 E8 AB
ØDF2: AD 2D 25 29 ØC C9 Ø8 FØ EE
ØDFA: 28 BØ Ø5 8A 4A FØ 22 AA A3
ØE02: 8E 34 25 A9 AØ 2D 33 25 F6
ØE0A: AC F3 24 91 28 C8 CA DØ E1
ØE12: FA 8C 35 25 AD 38 25 38 98
ØE1A: ED 34 25 AA AØ Ø2 4C 2E 5D
ØE22: ØE AE 38 25 AD F3 24 8D 5D
ØE2A: 35 25 AØ Ø2 B1 19 8C 34 9D
ØE32: 25 AC 35 25 Ø9 8Ø 2D 33 DC
ØE3A: 25 91 28 AC 34 25 EE 35 66
ØE42: 25 CA FØ Ø9 C8 CC 2C 25 49
ØE4A: DØ E2 2Ø A9 ØE 4C 76 ØE C2
ØE52: 2Ø 4E ØF AE 2C 25 CA CA 35
ØE5A: CA EC 38 25 BØ Ø3 4C E6 81
ØE62: ØD A9 2A Ø9 8Ø 2D 33 25 89
ØE6A: AC F3 24 AE 38 25 91 28 EA
ØE72: C8 CA DØ FA A4 1E A6 1D 77
ØE7A: C8 CC 2E 25 FØ Ø5 84 1E Ø9
ØE82: 4C A8 ØD AC F5 24 84 1E C2
ØE8A: AD 38 25 18 6D F3 24 8D C2
ØE92: F3 24 E8 86 1D EØ 33 FØ FA
ØE9A: 27 BD F6 24 18 6D F3 24 5D
ØEA2: C9 28 BØ 1C 4C A8 ØD EØ 85
ØEAA: ØØ FØ 14 AD F3 24 18 6D 2E
ØEB2: 38 25 A8 88 A9 AØ 2D 33 2F
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ØECA: 25 AØ Ø5 84 1E B9 6B 22 5B
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ØEEA: 1E CØ 18 DØ EØ AD 3Ø 25 99
ØEF2: 85 1D AD 31 25 85 1E AØ FD
ØEFA: ØØ A9 AØ 99 8Ø Ø2 C8 CØ 8D
ØF02: 78 DØ F8 38 2Ø C7 1F 9Ø 22
ØF0A: 35 AØ Ø2 A2 ØØ AD 2B 25 87
ØF12: C9 Ø2 DØ Ø9 AC 2C 25 B1 52
ØF1A: 19 8D 2C 25 C8 B1 19 Ø9 48
ØF22: 8Ø 9D 8Ø Ø2 E8 C8 CC 2C 48
ØF2A: 25 DØ F2 A9 3C 9D 8Ø Ø2 63
ØF32: AE 2B 25 BD BØ 22 29 3F 92
ØF3A: 8D 27 Ø4 4C AB ØA A9 2Ø 27
ØF42: 8D 27 Ø4 A9 3C 8D 8Ø Ø2 27
ØF4A: 2Ø AB ØA 6Ø A9 2Ø 8D ØØ 93
ØF52: Ø2 AØ Ø2 B1 19 C9 2A FØ 2A
ØF5A: F2 AD 2D 25 4A 4A 4A 4A AF
ØF62: 8D 36 25 A2 FF C9 ØF FØ D9
ØF6A: E2 B1 19 C9 2E DØ Ø9 AE 9B
ØF72: 36 25 FØ 1Ø E8 8E ØØ Ø2 97
ØF7A: 99 FF Ø1 C8 CC 2C 25 FØ 64
ØF82: Ø3 CA DØ E5 AD 36 25 FØ CE
ØF8A: 1E EØ ØØ FØ 1A AD ØØ Ø2 88
ØF92: C9 2Ø DØ ØA A9 2E 99 FF 91
ØF9A: Ø1 C8 AE 36 25 E8 A9 3Ø F4
ØFA2: 99 FF Ø1 C8 CA DØ F9 A9 71
ØFAA: 2Ø 8D ØØ Ø2 CC 2C 25 FØ AE
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ØFBA: Ø8 C9 35 BØ ØC C8 4C F4 12
ØFC2: ØF C8 B1 19 C9 35 9Ø 2A DØ
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ØFE2: CA 1Ø EB CA 9D ØØ Ø2 E8 6E
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ØFF2: ØØ Ø2 88 8C 2C 25 AD ØØ BC
ØFFA: Ø2 C9 2Ø DØ Ø9 A9 Ø1 85 14
1ØØ2: 1A A9 FF 85 19 6Ø A9 Ø1 9Ø
1ØØA: 85 1A A9 FE 85 19 EE 2C 33
1Ø12: 25 6Ø A9 ØØ 2C 59 25 3Ø 53
1Ø1A: Ø3 AD 61 CØ ØD 58 25 8D Ø1
1Ø22: 57 25 A9 23 AØ 79 2Ø 3E Ø8
1Ø2A: Ø9 2Ø 76 1Ø AØ ØØ A9 Ø2 Ø1
1Ø32: 2Ø 81 ØC 2Ø 36 Ø9 C9 ØØ AF
1Ø3A: DØ 33 CØ Ø4 9Ø 2F CØ 25 CF
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1042: B0 2B A5 1D 8D F4 24 AD 42
104A: 57 25 10 07 98 20 61 09 E2
1052: 4C 5B 10 98 A6 1D 9D F6 D6
105A: 24 20 8B 0C A5 1D CD 3C 40
1062: 25 90 07 AC 3C 25 88 8C F8
106A: F4 24 20 B0 0B 4C 7C 09 A8
1072: A9 01 D0 02 A9 00 8D 37 81
107A: 25 A0 00 A9 1F 20 ED FD 43
1082: A9 88 20 ED FD 20 25 09 40
108A: C9 0D F0 3F C9 08 F0 26 5B
1092: C9 7F F0 22 C9 20 90 ED 95
109A: AE 37 25 D0 08 C9 30 90 E9
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10AA: 26 F0 DA 99 00 02 09 80 A9
10B2: 20 ED FD C8 D0 C5 C0 00 C9
10BA: F0 CB A9 A0 20 ED FD A9 E3
10C2: 88 20 ED FD 20 ED FD 88 0A
10CA: 4C 7D 10 A9 A0 20 ED FD 6C
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10E2: F0 12 E6 1E AD F5 24 18 64
10EA: 69 12 C5 1E B0 06 EE F5 50
10F2: 24 20 28 0B 60 A5 1E C9 82
10FA: 01 F0 10 C6 1E AC F5 24 F9
1102: 88 C4 1E 90 06 CE F5 24 E1
110A: 20 28 0B 60 A5 1D C9 32 15
1112: F0 23 E6 1D AC 32 25 C4 61
111A: 1D B0 1A EE F4 24 AE F4 B3
1122: 24 A9 00 18 7D F6 24 E8 3B
112A: C9 25 90 F7 CA CA E4 1D 74
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113A: C9 01 F0 10 C6 1D AC F4 99
1142: 24 88 C4 1D 90 06 CE F4 32
114A: 24 20 B0 0B 60 A9 23 A0 DD
1152: 80 20 3E 09 20 72 10 A9 A9
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1162: B1 00 90 4E 38 E9 41 30 70
116A: 49 F0 06 C9 02 B0 43 A9 CD
1172: 1A 8D 3B 25 20 B1 00 90 17
117A: 39 38 E9 40 30 34 F0 32 EE
1182: C9 1B B0 2E 18 6D 3B 25 5B
118A: C9 33 B0 26 8D 3B 25 20 9A
1192: B1 00 B0 1E 20 4A EC 20 A9
119A: 36 09 C9 00 D0 14 C0 00 AB
11A2: F0 10 C0 C9 B0 0C C0 B7 E4
11AA: 90 0B A9 B6 8D F5 24 4C 51
11B2: BA 11 4C 7C 09 8C F5 24 52
11BA: 84 1E 20 8B 0C AD 3B 25 16
11C2: CD 3C 25 90 0A AC 3C 25 29
11CA: 88 8C F4 24 4C D4 11 8D 9A
11D2: F4 24 85 1D 20 22 0B 4C E6
11DA: 7C 09 AD F4 24 C5 1D D0 C5
11E2: 17 AD F5 24 C5 1E D0 10 55
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11F2: F5 24 85 1E 20 22 0B 60 AB
11FA: AD F4 24 85 1D AD F5 24 BD
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120A: 25 20 B1 00 8D 50 25 20 17
1212: B1 00 8D 51 25 20 B1 00 E2
121A: C9 28 F0 03 4C 4D 22 AE 06
1222: 6A 12 AD 4F 25 DD 6A 12 32
122A: F0 06 CA D0 F5 4C 4D 22 4C
1232: AD 50 25 DD 76 12 F0 02 A3
123A: D0 F0 AD 51 25 DD 82 12 85
1242: D0 E8 8E 29 25 E0 0B B0 E0
124A: 0C 8A 48 A9 00 48 4C 22 96
1252: 21 68 8D 29 25 20 B1 00 72
125A: AE 29 25 CA 8A 0A AA BD 01
1262: 90 12 48 BD 8F 12 48 60 ED
126A: 0C 41 41 43 45 49 4C 53 7C
1272: 53 53 54 53 41 42 54 4F DF
127A: 58 4E 4F 47 49 51 41 55 24
1282: 56 53 4E 53 50 54 47 4E 56
128A: 4E 52 4E 4D 45 AE EB 9D 63
1292: F0 E9 EF 08 EF 22 EC 40 4A
129A: E9 8F EB F0 EF 8C EE 39 EC
12A2: F0 A9 13 11 14 20 64 13 1A
12AA: 8E 52 25 8C 54 25 20 B7 47
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12BA: 20 64 13 8E 53 25 8C 55 F0
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12CA: 20 B1 00 AE 52 25 CA EC FF
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12FA: 20 C7 1F 90 42 A0 00 B1 54
1302: 19 29 03 C9 01 F0 38 C8 01
130A: B1 19 8D 3C 25 A2 00 C8 41
1312: B1 19 9D 00 02 E8 C8 CC 1D
131A: 3C 25 D0 F4 A5 B8 48 A5 57
1322: B9 48 A9 00 9D 00 02 A9 07
132A: 02 A0 00 20 81 0C 68 85 0E
1332: B9 68 85 B8 A5 1D CD 53 1C
133A: 25 F0 15 E6 1D 18 60 AD F7
1342: 39 25 85 1D AD 3A 25 85 F6
134A: 1E 18 20 C7 1F 4C 4D 22 EC
1352: AD 52 25 85 1D A5 1E CD 6A
135A: 55 25 F0 04 E6 1E 18 60 13
1362: 38 60 A2 00 20 B7 00 C9 BA
136A: 41 F0 06 C9 42 D0 D0 A2 64
1372: 1A 8E 3B 25 20 B1 00 C9 94
137A: 41 90 C4 C9 5B B0 C0 38 F1
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1392: B0 AD 20 4A EC 20 36 09 82
139A: C9 00 D0 A3 C0 00 F0 9F 81
13A2: C0 C9 B0 9B AE 3B 25 60 78
13AA: A9 01 8D 29 25 A9 00 8D 87
13B2: 2A 25 20 A7 12 20 F9 12 CC
13BA: B0 47 20 72 EB A5 A2 48 B9
13C2: A5 A1 48 A5 A0 48 A5 9F 98
13CA: 48 A5 9E 48 A5 9D 48 EE F9
13D2: 29 25 D0 03 EE 2A 25 20 AB
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13E2: 85 A5 68 85 A6 68 85 A7 24
13EA: 68 85 A8 68 85 A9 68 85 6B
13F2: AA 45 A2 85 AB A5 9D 20 BB
13FA: C1 E7 AD 3B 25 48 28 90 90
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140A: 25 85 1E 18 20 C7 1F 60 2A
1412: 20 AA 13 A2 06 B5 9C 95 57
141A: A4 CA D0 F9 AD 2A 25 AC 0E
1422: 29 25 20 F2 E2 A5 AA 45 A3
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1432: 60 20 58 FC A9 01 8D 56 30
143A: 25 A9 00 2C 59 25 30 03 E4
1442: AD 61 C0 0D 58 25 30 03 3D
144A: 4C A9 14 A9 24 A0 91 20 07
1452: 3E 09 20 25 09 C9 53 F0 39
145A: 0B C9 44 F0 0E C9 50 F0 3B
1462: 28 4C B2 15 A9 03 8D 56 24
146A: 25 D0 3C A9 00 8D 56 25 83
1472: A0 B5 A9 24 20 3E 09 20 FB
147A: 72 10 A9 00 AA 20 0A 1B 1A
1482: F0 25 C9 06 F0 21 4C A5 50
148A: 15 A9 24 A0 8A 20 3E 09 90
1492: 20 25 09 38 E9 30 C9 00 5C
149A: B0 03 4C B2 15 C9 08 90 01
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14B2: FE AD 56 25 F0 14 C9 03 51
14BA: D0 0D AD 05 C3 18 6D 07 F4
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14D2: 30 25 A5 1E 8D 55 25 8D 8C
14DA: 31 25 A9 01 85 1D 85 1E F3
14E2: A9 8D 20 BB 15 A6 1D BD 3E
14EA: F6 24 8D 38 25 AA A9 00 F3
14F2: 9D 00 03 CA A9 20 9D 00 FF
14FA: 03 CA 10 FA 38 20 C7 1F F9
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1512: AA E8 30 14 E8 AD 2D 25 90
151A: 29 0C C9 08 F0 0A B0 27 CD
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152A: A2 00 F0 1B 20 4E 0F AE 7C
1532: 2C 25 CA CA CA EC 38 25 61
153A: 90 CF AE 38 25 A9 2A 9D BB
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154A: 02 B1 19 9D 00 03 E8 C8 85
1552: EC 38 25 F0 05 CC 2C 25 8D
155A: D0 EF A2 00 BD 00 03 F0 22
1562: 08 09 80 20 BB 15 E8 D0 B9
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1572: E6 1D 4C E7 14 A5 1E CD A0
157A: 55 25 F0 0E E6 1E A9 01 9B
1582: 85 1D A9 8D 20 BB 15 4C 2B
158A: E7 14 A9 8D 20 BB 15 AD 83
1592: 56 25 C9 03 D0 03 20 25 92
159A: 09 A9 00 20 95 FE AD 56 10
15A2: 25 D0 03 20 52 1B AD 30 80
15AA: 25 85 1D AD 31 25 85 1E 8E
15B2: 20 58 FC 20 22 0B 4C 7C F6
15BA: 09 48 AD 56 25 F0 04 68 F3
15C2: 4C ED FD 68 4C 95 1B A9 6D
15CA: 00 2C 59 25 30 03 AD 61 C7
15D2: C0 0D 58 25 8D 3F 25 A9 5B
15DA: 00 8D 40 25 A5 1D 8D 41 C0
15E2: 25 A5 1E 8D 42 25 4C 0D F1
15EA: 16 4C 7C 09 A9 00 2C 59 52
15F2: 25 30 03 AD 61 C0 0D 58 77
15FA: 25 8D 3F 25 A9 01 8D 40 02
1602: 25 A5 1D 8D 41 25 A5 1E AE
160A: 8D 42 25 20 48 16 AD 30 5A
1612: 25 8D 45 25 AD 31 25 8D 39
161A: 46 25 20 52 16 AE 41 25 EE
1622: CA EC 45 25 B0 13 AE 42 5B
162A: 25 CA EC 46 25 B0 0A A9 47
1632: 23 A0 FA 20 3E 09 20 44 14
163A: 18 AD 43 25 85 1D AD 44 D8
1642: 25 85 1E 4C 7C 09 A9 24 6A
164A: A0 59 20 3E 09 4C 59 16 47
1652: A9 24 A0 31 20 3E 09 20 AF
165A: 88 0D 20 25 09 AE 8D 16 98
1662: DD 8D 16 F0 06 CA D0 F8 A8
166A: 4C 59 16 CA 8A 0A AA A9 FD
1672: 16 48 A9 58 48 BD 95 16 F0
167A: 48 BD 94 16 48 60 68 68 2B
1682: A5 1D 8D 43 25 A5 1E 8D 38
168A: 44 25 60 06 00 0B 0A 08 D6
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16B2: 1D AD 48 25 85 1E 38 20 69
16BA: C7 1F 90 45 A0 02 AD 2B 8C
16C2: 25 C9 02 D0 09 AC 2C 25 B9
16CA: B1 19 8D 2C 25 C8 A2 00 1C
16D2: B1 19 9D 00 03 E8 C8 CC EB
16DA: 2C 25 D0 F4 A9 00 9D 00 58
16E2: 03 8E 2C 25 20 25 17 AD 7D
16EA: 40 25 D0 03 20 13 17 AD F3
16F2: 49 25 85 1D AD 4A 25 85 F5
16FA: 1E 18 20 C7 1F 20 27 20 A4
1702: 60 AD 49 25 85 1D AD 4A 8D
170A: 25 85 1E 18 20 C7 1F 90 60
1712: EF 20 33 1E 18 20 C7 1F 78
171A: A9 00 A8 91 1B C8 91 1B 85
1722: 4C 02 17 AD 3F 25 30 01 A4
172A: 60 AD 2B 25 C9 02 F0 01 E4
1732: 60 AD 49 25 38 ED 47 25 A4
173A: 8D 4D 25 AD 4A 25 38 ED 47
1742: 48 25 8D 4E 25 A2 00 8E B6
174A: 2A 25 BD 00 03 9D 80 02 20
1752: E8 EC 2C 25 D0 F4 A9 00 B5
175A: 9D 80 02 A9 80 85 B8 A9 87
1762: 02 85 B9 A9 00 85 FB A9 7C
176A: 03 85 FC 20 B7 00 20 37 52
1772: 18 20 B1 00 C9 00 D0 03 DD
177A: 4C 2C 18 C9 40 D0 03 4C 11
1782: 17 18 90 EA C9 43 B0 E6 A6
178A: A2 00 C9 42 D0 02 A2 1A 55
1792: 8E 29 25 20 B1 00 C9 41 5B
179A: 90 66 C9 5B B0 62 38 E9 03
17A2: 40 18 6D 29 25 C9 33 B0 9E
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17B2: 1B 90 05 A2 42 38 E9 1A 3E
17BA: 18 69 40 8D 29 25 8A 20 43
17C2: 37 18 AD 29 25 20 37 18 0B
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17D2: 20 36 09 C9 00 D0 29 C0 B2
17DA: 00 F0 25 C0 C9 B0 21 98 E1
17E2: 18 6D 4E 25 A8 A9 00 20 A0
17EA: F2 E2 20 34 ED A2 00 BD 4A
17F2: 00 01 F0 06 20 37 18 E8 D6
17FA: D0 F5 20 B7 00 4C 76 17 C3
1802: A2 00 BD 80 02 F0 06 9D C0
180A: 00 03 E8 D0 F5 A9 00 9D 19
1812: 00 03 4C 36 18 20 37 18 B7
181A: 20 B1 00 20 37 18 20 B1 D4
1822: 00 20 37 18 20 B1 00 4C D6
182A: 70 17 AC 2A 25 8C 2C 25 69
1832: A9 00 91 FB 60 AC 2A 25 58
183A: C0 78 F0 05 91 FB EE 2A DB
1842: 25 60 AD 45 25 38 ED 41 4E
184A: 25 18 6D 30 25 8D 4B 25 DE
1852: AD 46 25 38 ED 42 25 18 ED
185A: 6D 31 25 8D 4C 25 AD 42 9F
1862: 25 CD 31 25 B0 03 4C 07 42
186A: 19 AD 41 25 CD 30 25 90 17
1872: 4A AD 41 25 8D 47 25 AD 2F
187A: 42 25 8D 48 25 AD 30 25 B0
1882: 8D 49 25 AD 31 25 8D 4A CE
188A: 25 20 A0 16 AD 47 25 CD 6D
1892: 45 25 F0 08 EE 47 25 EE 1B
189A: 49 25 D0 ED AD 48 25 CD 58
18A2: 46 25 F0 14 EE 48 25 EE 70
18AA: 4A 25 AD 41 25 8D 47 25 26
18B2: AD 30 25 8D 49 25 D0 D1 95
18BA: 4C A0 19 AD 45 25 8D 47 58
18C2: 25 AD 4B 25 8D 49 25 AD 36
18CA: 42 25 8D 48 25 AD 31 25 03
18D2: 8D 4A 25 20 A0 16 AD 47 03
18DA: 25 CD 41 25 F0 08 CE 47 18
18E2: 25 CE 49 25 D0 ED AD 48 B6
18EA: 25 CD 46 25 F0 CA EE 48 15
18F2: 25 EE 4A 25 AD 45 25 8D 67
18FA: 47 25 AD 4B 25 8D 49 25 99
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1902: D0 D1 4C A0 19 AD 41 25 CB
190A: CD 30 25 90 4A AD 41 25 8D
1912: 8D 47 25 AD 46 25 8D 48 86
191A: 25 AD 30 25 8D 49 25 AD 2C
1922: 4C 25 8D 4A 25 20 A0 16 1B
192A: AD 47 25 CD 45 25 F0 08 2F
1932: EE 47 25 EE 49 25 D0 ED AF
193A: AD 48 25 CD 42 25 F0 14 73
1942: CE 48 25 CE 4A 25 AD 41 03
194A: 25 8D 47 25 AD 30 25 8D B3
1952: 49 25 D0 D1 4C A0 19 AD 6E
195A: 45 25 8D 47 25 AD 4B 25 3A
1962: 8D 49 25 AD 46 25 8D 48 57
196A: 25 AD 4C 25 8D 4A 25 20 76
1972: A0 16 AD 47 25 CD 41 25 AC
197A: F0 08 CE 47 25 CE 49 25 91
1982: D0 ED AD 48 25 CD 42 25 DC
198A: F0 14 CE 48 25 CE 4A 25 B6
1992: AD 45 25 8D 47 25 AD 4B DF
199A: 25 8D 49 25 D0 D1 4C 09 AD
19A2: 1C A9 23 A0 99 20 3E 09 8E
19AA: 20 72 10 D0 03 4C 7C 09 E3
19B2: A2 00 A9 08 20 0A 1B F0 3C
19BA: 07 C9 06 F0 03 4C B7 1B 86
19C2: A9 FF 20 95 1B A9 FF 20 C6
19CA: 95 1B A5 6F 20 95 1B A5 6D
19D2: 70 20 95 1B A0 32 B9 F6 E1
19DA: 24 20 95 1B 88 D0 F7 AD B0
19E2: EF 24 85 1B AD F0 24 85 77
19EA: 1C A0 01 B1 1B F0 16 A5 FC
19F2: 1B 20 95 1B A5 1C 20 95 92
19FA: 1B 88 B1 1B 20 95 1B C8 1B
1A02: B1 1B 20 95 1B A5 1B 18 F0
1A0A: 69 02 85 1B A5 1C 69 00 46
1A12: 85 1C A5 1C C5 6C D0 D1 D9
1A1A: A9 FF 20 95 1B A5 6B 85 4C
1A22: 1B A5 6C 85 1C A0 00 B1 48
1A2A: 1B 20 95 1B C8 D0 F8 E6 BA
1A32: 1C A5 1C C5 70 90 F0 F0 56
1A3A: EE 20 52 1B 4C CD 1A A9 61
1A42: 23 A0 9F 20 3E 09 20 72 EE
1A4A: 10 D0 03 4C 7C 09 A2 01 2E
1A52: A9 08 20 0A 1B F0 03 4C F0
1A5A: B7 1B 20 79 1B C9 FF D0 9D
1A62: 60 20 79 1B C9 FF D0 59 F8
1A6A: 20 FA 0A 20 79 1B 85 6F 63
1A72: 20 79 1B 85 70 A0 32 20 5B
1A7A: 79 1B 99 F6 24 88 D0 F7 B1
1A82: 20 79 1B C9 FF F0 18 85 9E
1A8A: 1B 20 79 1B 85 1C 20 79 8B
1A92: 1B A0 00 91 1B 20 79 1B FC
1A9A: A0 01 91 1B 4C 82 1A A5 89
1AA2: 6B 85 1B A5 6C 85 1C A0 FD
1AAA: 00 20 79 1B 91 1B C8 D0 23
1AB2: F8 E6 1C A5 1C C5 70 90 64
1ABA: F0 F0 EE 20 52 1B 4C CD E8
1AC2: 1A 20 52 1B A9 24 A0 DA 02
1ACA: 4C 3E 09 AD C5 B5 D0 08 5F
1AD2: A9 24 A0 BF 20 3E 09 60 61
1ADA: 20 6F 09 A9 00 85 24 85 9A
1AE2: 28 A9 04 85 29 20 80 FE 38
1AEA: AE C5 B5 BD 3F AA AA 8E 03
1AF2: 29 25 BD 71 A9 48 09 80 D4
1AFA: 20 ED FD AE 29 25 E8 68 7D
1B02: 10 ED A9 87 20 F0 FD 60 8A
1B0A: 8D C2 B5 A9 01 8D BB B5 74
1B12: 8D C0 B5 A9 00 8D BD B5 F7
1B1A: 8D BE B5 8D BF B5 A9 06 84
1B22: 8D C1 B5 A0 3C A9 A0 99 B3
1B2A: 74 AA 88 D0 FA A0 00 B9 77
1B32: 00 02 F0 08 09 80 99 75 7A
1B3A: AA C8 D0 F3 A9 AA 8D C4 29
1B42: B5 A9 75 8D C3 B5 20 60 DA
1B4A: 1B 20 D6 03 AD C5 B5 60 71
1B52: A9 02 8D BB B5 20 60 1B 55
1B5A: A2 01 20 D6 03 60 A9 00 80
1B62: 8D C7 B5 8D C9 B5 8D CB EC
1B6A: B5 A0 A6 8C CC B5 C8 8C 9C
1B72: CA B5 C8 8C C8 B5 60 8D C8
1B7A: C3 B5 98 48 8A 48 A9 03 63
1B82: 8D BB B5 A9 01 8D BC B5 2D
1B8A: 20 60 1B A2 01 20 D6 03 AF
1B92: 4C AE 1B 8D C3 B5 98 48 45
1B9A: 8A 48 A9 04 8D BB B5 A9 0E
1BA2: 01 8D BC B5 20 60 1B A2 0B
1BAA: 01 20 D6 03 AD C5 B5 F0 55
1BB2: 12 68 68 68 68 AD C5 B5 DA
1BBA: 48 20 52 1B 68 8D C5 B5 D3
1BC2: 4C CD 1A 68 AA 68 A8 AD 52
1BCA: C3 B5 60 20 58 FC 20 84 D9
1BD2: FE A9 06 8D BB B5 8D C1 1E
1BDA: B5 A9 01 8D C0 B5 20 60 CC
1BE2: 1B A2 01 20 D6 03 A9 23 AA
1BEA: 85 FC A9 EC 85 FB 20 54 D7
1BF2: 09 20 12 09 C9 0D D0 F9 A6
1BFA: 20 58 FC 20 22 0B 4C 7C 4B
1C02: 09 AD B3 22 D0 01 60 A9 B7
1C0A: 24 A0 C9 20 3E 09 A5 1D 36
1C12: 8D 30 25 A5 1E 8D 31 25 CA
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1C22: 24 85 1B AD F0 24 85 1C 4B
1C2A: A0 01 B1 1B F0 35 85 1A 5C
1C32: 88 B1 1B 85 19 B1 19 29 C1
1C3A: 03 C9 02 D0 26 38 20 C7 CD
1C42: 1F A2 00 AC 2C 25 B1 19 EF
1C4A: 8D 2C 25 C8 B1 19 9D 00 B2
1C52: 03 E8 C8 CC 2C 25 D0 F4 B8
1C5A: A9 00 9D 00 03 8E 2C 25 EA
1C62: 20 27 20 A5 1B 18 69 02 E0
1C6A: 85 1B 90 02 E6 1C E6 1E F1
1C72: A5 1E C9 C9 D0 B2 A9 01 80
1C7A: 85 1E E6 1D A5 1D C9 33 14
1C82: D0 A6 AD 30 25 85 1D AD AC
1C8A: 31 25 85 1E 38 20 C7 1F 28
1C92: 4C 7C 09 20 33 1E 18 20 95
1C9A: C7 1F A9 00 A8 91 1B C8 3E
1CA2: 91 1B 20 03 1C 60 A9 23 77
1CAA: A0 86 20 3E 09 A9 00 2C D7
1CB2: 59 25 30 03 AD 61 C0 0D 98
1CBA: 58 25 30 08 AD B3 22 49 B8
1CC2: FF 8D B3 22 AD B3 22 C9 41
1CCA: 00 F0 06 A9 CE 20 ED FD 6B
1CD2: 60 A9 C6 20 ED FD 20 ED 16
1CDA: FD 60 EE 6A 22 20 B8 09 BA
1CE2: CE 6A 22 AD 00 03 F0 4E 78
1CEA: C9 3D F0 27 AE C4 08 DD 5E
1CF2: C4 08 F0 08 CA D0 F8 A9 63
1CFA: 01 4C 17 1D AD 2C 25 C9 AD
1D02: 25 B0 33 A0 00 A9 03 20 38
1D0A: 81 0C 20 B7 00 D0 E8 A9 46
1D12: 00 F0 02 A9 02 8D 2B 25 25
1D1A: 18 20 C7 1F B0 09 AD B4 0D
1D22: 22 8D 2D 25 4C 32 1D A0 CE
1D2A: 00 B1 19 29 FC 8D 2D 25 24
1D32: 20 27 20 20 03 1C 60 AE 44
1D3A: 36 25 CA CA CA CA BD 00 DB
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1D4A: 02 8D 3B 25 E8 BD 00 02 E2
1D52: 38 E9 30 8D 2A 25 E8 BD 77
1D5A: 00 02 38 E9 30 AE 2A 25 70
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1D82: F0 F4 C8 D0 F1 88 8C 3B 9E
1D8A: 25 AD 29 25 38 ED 3B 25 4F
1D92: 8D 29 25 A2 01 A0 01 BD F6
1D9A: 00 02 E8 C9 2E F0 F8 C9 FF
1DA2: 45 F0 06 99 00 02 C8 D0 80
1DAA: EE A9 30 AE 29 25 99 00 C8
1DB2: 02 C8 CA D0 F9 A9 00 99 96
1DBA: 00 02 8C 36 25 60 CE 29 DB
1DC2: 25 A2 00 A0 00 BD 00 02 3B
1DCA: E8 C9 2E F0 F8 C9 45 F0 2B
1DD2: 06 99 80 02 C8 D0 EE A9 B7
1DDA: 00 99 80 02 A9 2E 8D 00 CC
1DE2: 02 AE 29 25 A9 30 9D 00 8A
1DEA: 02 CA D0 FA A2 00 AC 29 3A
1DF2: 25 C8 BD 80 02 99 00 02 2A
1DFA: F0 04 E8 C8 D0 F4 8C 36 02
1E02: 25 60 20 6F 09 A9 04 85 60
1E0A: 29 A9 00 85 28 85 24 AD EA
1E12: F1 24 38 E5 6F A8 AD F2 22
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1E22: F2 E2 20 34 ED A9 01 85 75
1E2A: FC A9 00 85 FB 20 54 09 B9
1E32: 60 A0 01 B1 1B F0 E7 A9 18
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1E4A: 19 A8 B1 19 4C 54 1E C8 BD
1E52: B1 19 85 FB 18 65 19 8D 34
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1E6A: 1E A5 70 38 ED 77 1E AA E4
1E72: E8 A0 00 B9 FF FF 99 FF 1A
1E7A: FF C8 D0 F7 EE 77 1E EE 03
1E82: 7A 1E CA D0 EE A5 6F 38 0F
1E8A: E5 FB 85 6F A5 70 E9 00 23
1E92: 85 70 AD EF 24 85 FD AD 43
1E9A: F0 24 85 FE A0 01 B1 FD 63
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1EAA: 8D 29 25 C8 B1 FD E5 1A 94
1EB2: 0D 29 25 90 0F 88 B1 FD 69
1EBA: 38 E5 FB 91 FD C8 B1 FD 99
1EC2: E9 00 91 FD C8 F0 03 C8 DE
1ECA: D0 D4 E6 FE C8 A5 FE C5 12
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1EFA: 25 8D 2B 25 AD 3D 25 8D 1F
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1F12: 25 A5 1E 8D 3A 25 AD 2B D5
1F1A: 25 8D 3B 25 AD 2D 25 8D 02
1F22: 3D 25 AD 2C 25 8D 3C 25 BD
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1F4A: 33 B0 9D 85 1D 20 B1 00 27
1F52: B0 96 20 4A EC 20 36 09 94
1F5A: C9 00 D0 8C C0 00 F0 88 D0
1F62: C0 C9 B0 84 84 1E 38 20 FE
1F6A: C7 1F 90 07 AD 2B 25 C9 05
1F72: 01 D0 03 4C EA 1E A0 02 9D
1F7A: A2 00 B1 19 C9 2A F0 F3 9E
1F82: B1 19 9D 00 02 C8 E8 CC 65
1F8A: 2C 25 D0 F4 A9 00 9D 00 1A
1F92: 02 A5 B8 48 A5 B9 48 A0 1C
1F9A: 00 A9 02 20 81 0C 68 85 18
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1FAA: 1D AD 3A 25 85 1E 18 20 71
1FB2: C7 1F AD 3B 25 8D 2B 25 E0
1FBA: AD 3D 25 8D 2D 25 AD 3C 32
1FC2: 25 8D 2C 25 60 08 A6 1D 5C
1FCA: CA 86 1B A9 C8 85 1C 18 BA
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1FE2: 1C A6 1E CA 8A 18 65 1B E3
1FEA: 85 1B A5 1C 69 00 85 1C 9B
1FF2: 06 1B 26 1C A5 1C 6D F0 EA
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2012: 19 29 03 8D 2B 25 B1 19 CC
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2032: 2C 25 EE 2C 25 A0 00 A5 C3
203A: 6F 91 1B C8 A5 70 91 1B B3
2042: 88 AD 2B 25 0D 2D 25 91 E2
204A: 6F C8 AD 2C 25 91 6F C8 04
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205A: E8 CC 2C 25 D0 F4 4C B6 C3
2062: 20 20 F2 20 EE 36 25 EE A4
206A: 36 25 38 AD 36 25 6D 2C 3E
2072: 25 8D 2C 25 AC 36 25 AD B6
207A: 2C 25 91 6F A2 00 C8 BD A7
2082: 00 03 91 6F C8 E8 CC 2C 5C
208A: 25 D0 F4 A0 00 A5 6F 91 41
2092: 1B C8 A5 70 91 1B 88 AD 06
209A: 2B 25 0D 2D 25 91 6F C8 45
20A2: AD 36 25 91 6F C8 A2 02 EA
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20BA: 2C 25 90 06 A5 70 C9 A4 F3
20C2: F0 0F A5 6F 18 6D 2C 25 DE
20CA: 85 6F A5 70 69 00 85 70 2C
20D2: 60 A9 00 A8 91 1B C8 91 54
20DA: 1B A9 24 A0 13 20 3E 09 40
20E2: A5 1D 8D F4 24 A5 1E 8D 8F
20EA: F5 24 A2 FD 9A 4C 7C 08 6A
20F2: BA 8E 3E 25 A2 00 A0 00 A4
20FA: BD 00 03 C9 28 D0 01 C8 66
2102: C9 29 D0 01 88 9D 00 03 5B
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2112: F0 03 4C 4D 22 A9 00 48 EB
211A: A9 00 85 B8 A9 03 85 B9 8B
2122: 20 B1 00 90 51 C9 2D F0 E6
212A: 4D C9 2B F0 49 C9 2E F0 B8
2132: 45 C9 50 F0 25 C9 28 F0 34
213A: 15 C9 41 F0 0B C9 42 F0 A5
2142: 07 C9 40 F0 0F 4C 4D 22 F7
214A: 20 0D 1F 4C 7B 21 A9 01 3D
2152: 48 4C 22 21 20 05 12 4C A7
215A: 7B 21 20 B1 00 C9 49 F0 6C
2162: 03 4C 4D 22 A9 73 A0 21 82
216A: 20 F9 EA 20 B1 00 4C 7B 3C
2172: 21 82 49 0F DA A1 20 4A E7
217A: EC 20 B7 00 F0 78 A2 02 E2
2182: C9 2B F0 35 E8 C9 2D F0 9F
218A: 30 E8 C9 2A F0 2B E8 C9 CA
2192: 2F F0 26 E8 C9 5E F0 21 C6
219A: C9 29 F0 03 4C 4D 22 68 9E
21A2: F0 14 C9 01 F0 07 48 20 FF
21AA: 19 22 4C A1 21 E6 B8 D0 8C
21B2: 02 E6 B9 4C 7B 21 4C 53 F7
21BA: 12 86 06 68 48 A8 B9 9B E2
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21C2: 22 DD 9B 22 90 10 20 19 41
21CA: 22 A6 06 68 48 A8 B9 9B 03
21D2: 22 DD 9B 22 B0 F0 20 72 2F
21DA: EB A5 A2 48 A5 A1 48 A5 3F
21E2: A0 48 A5 9F 48 A5 9E 48 94
21EA: A5 9D 48 A5 06 48 4C 22 D6
21F2: 21 F0 58 4C 69 EA 68 48 E1
21FA: F0 06 20 19 22 4C F8 21 22
2202: 68 20 34 ED A0 00 B9 00 60
220A: 01 99 00 02 F0 03 C8 D0 4B
2212: F5 8C 36 25 4C 39 1D 68 77
221A: 85 FB 68 85 FC 68 85 07 21
2222: 68 85 A5 68 85 A6 68 85 54
222A: A7 68 85 A8 68 85 A9 68 AC
2232: 85 AA 45 A2 85 AB A5 07 E3
223A: 0A A8 A5 FC 48 A5 FB 48 4B
2242: B9 A3 22 48 B9 A2 22 48 F9
224A: A5 9D 60 AE 3E 25 9A A9 25
2252: 07 8D 36 25 A0 00 B9 1B 2A
225A: 23 99 00 02 C8 C0 07 D0 DE
2262: F5 A9 00 99 00 02 60 00 6E
226A: 00 04 04 05 05 06 06 07 D3
2272: 07 04 04 05 05 06 06 07 5F
227A: 07 04 04 05 05 06 06 07 67
2282: 07 00 80 00 80 00 80 00 5F
228A: 80 28 A8 28 A8 28 A8 28 10
2292: A8 50 D0 50 D0 50 D0 50 18
229A: D0 00 01 02 02 03 03 04 AD
22A2: 01 22 01 22 C0 E7 A9 E7 13
22AA: 81 E9 F2 21 96 EE 4E 54 FB
22B2: 46 00 2C 40 40 41 41 41 6E
22BA: 42 41 43 41 44 41 45 41 DF
22C2: 46 41 47 41 48 41 49 41 92
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22F2: 44 42 45 42 46 42 47 42 C2
22FA: 48 42 49 42 4A 42 4B 42 75
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230A: 50 42 51 42 52 42 53 42 DB
2312: 54 42 55 42 56 42 57 42 8E
231A: 58 2A 45 52 52 4F 52 2A 83
2322: C5 D8 C9 D4 BA A0 C1 D2 B6
232A: C5 A0 D9 CF D5 A0 D3 D5 62
2332: D2 C5 A0 A8 D9 AF CE A9 C6
233A: BF 00 D3 D0 C5 C5 C4 C3 7A
2342: C1 CC C3 00 D3 D0 C5 C5 48
234A: C4 C3 C1 CC C3 A0 C2 D9 E8
2352: A0 CB C5 D6 C9 CE A0 CD 9A
235A: C1 D2 D4 C9 CE 00 CE C5 47
2362: D7 BA A0 C1 D2 C5 A0 D9 3C
236A: CF D5 A0 D3 D5 D2 C5 A0 85
2372: A8 D9 AF CE A9 BF 00 D7 8A
237A: C9 C4 D4 C8 BA 00 C7 CF 33
2382: D4 CF BA 00 D2 C5 C3 C1 75
238A: CC C3 D5 CC C1 D4 C9 CF 74
2392: CE A0 C9 D3 A0 CF 00 D3 F6
239A: C1 D6 C5 BA 00 CC CF C1 70
23A2: C4 BA 00 C6 CF D2 CD C1 8D
23AA: D4 BA A0 A0 CC C5 C6 D4 08
23B2: AC A0 C3 C5 CE D4 C5 D2 74
23BA: AC A0 CF D2 A0 D2 C9 C7 52
23C2: C8 D4 A0 CA D5 D3 D4 C9 D4
23CA: C6 D9 BF 00 C6 CF D2 CD CB
23D2: C1 D4 BA A0 A0 A3 A0 CF 35
23DA: C6 A0 C4 C5 C3 C9 CD C1 44
23E2: CC A0 D0 CC C1 C3 C5 D3 1B
23EA: BA 00 8D D0 D2 C5 D3 D3 76
23F2: A0 D2 C5 D4 D5 D2 CE 00 DB
23FA: D0 D2 CF C3 C5 D3 D3 C9 83
2402: CE C7 A0 C4 C1 D4 C1 A0 89
240A: D4 D2 C1 CE D3 C6 C5 D2 AE
2412: 00 CE CF D4 A0 C5 CE CF DE
241A: D5 C7 C8 A0 D2 CF CF CD A5
2422: A0 D4 CF A0 C5 CE D4 C5 CC
242A: D2 A0 C4 C1 D4 C1 00 CD 34
2432: CF D6 C5 A0 C3 D5 D2 D3 C9
243A: CF D2 A0 D4 CF A0 D4 CF FA
2442: D0 A0 CC C5 C6 D4 A0 CF AB
244A: C6 A0 CE C5 D7 A0 D0 CF 07
2452: D3 C9 D4 C9 CF CE 00 CD B5
245A: CF D6 C5 A0 C3 D5 D2 D3 F1
2462: CF D2 A0 D4 CF A0 C2 CF FE
246A: D4 D4 CF CD A0 D2 C9 C7 D4
2472: C8 D4 A0 CF C6 A0 C2 CC 70
247A: CF C3 CB 00 D0 D2 C9 CE 49
2482: D4 C9 CE C7 AE AE AE 00 8B
248A: D3 CC CF D4 A0 A3 00 D0 9B
2492: D2 C9 CE D4 A0 D4 CF BA 90
249A: A0 A0 D3 C3 D2 C5 C5 CE 1A
24A2: AC A0 C4 C9 D3 CB A0 CF 7D
24AA: D2 A0 D0 D2 C9 CE D4 C5 C4
24B2: D2 BF 00 C6 C9 CC C5 CE 9C
24BA: C1 CD C5 BA 00 CE CF A0 37
24C2: C5 D2 D2 CF D2 D3 00 D2 B2
24CA: C5 C3 C1 CC C3 D5 CC C1 BC
24D2: D4 C9 CE C7 AE AE AE 00 DB
24DA: CE CF D4 A0 C1 A0 D3 D0 2C
24E2: C5 C5 C4 C3 C1 CC C3 A0 BD
24EA: C6 C9 CC C5 00 9D 20 16 CB
24F2: A4 20 C8 9F 20 51 A8 6C AC
```

Apple *SpeedCalc* for ProDOS

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```
2000: 4C A7 3A 00 0A 08 0A 00 1C
2008: A5 AB 33 30 00 14 08 14 E3
2010: 00 8C 32 30 38 33 00 1E 69
2018: 08 1E 00 8C 32 30 38 30 9F
2020: 00 00 00 4C 88 22 20 58 8A
2028: FC AD 61 C0 8D C9 25 A9 12
2030: 00 8D F2 03 A9 09 8D F3 E2
2038: 03 49 A5 8D F4 03 A9 FD DE
2040: 85 39 85 37 A9 1B 85 38 B2
2048: A9 F0 85 36 A9 25 18 69 29
2050: 01 8D 60 25 18 69 4F 85 5D
2058: 6C A9 00 8D 5F 25 8D 61 1E
2060: 25 85 6B 8D D1 22 85 FF FC
2068: 8D C8 25 A9 B9 8D 62 25 CE
2070: A9 09 20 61 09 20 D9 0A 68
2078: A9 23 A0 AE 20 3E 09 20 81
2080: 88 0D 20 25 09 48 20 7C C4
2088: 09 68 AE AC 08 DD AC 08 21
2090: F0 0A CA D0 F8 C9 20 90 F1
2098: E6 4C 37 0C CA 8A 0A AA 46
20A0: A9 08 48 A9 7B 48 BD D3 A7
20A8: 08 48 BD D2 08 48 60 17 1D
20B0: 0E 00 17 06 07 10 03 13 CC
20B8: 0C 18 0A 0B 15 08 02 05 C8
20C0: 21 01 12 04 0D 1B 23 0D 7C
20C8: 31 32 33 34 35 36 37 38 01
20D0: 39 30 2B 2D 2E C4 0A DB 66
20D8: 11 13 10 A8 0C 4E 11 32 E0
20E0: 14 E6 15 9B 19 31 1A 10 13
20E8: 1F DD 10 F6 10 0D 11 37 AF
20F0: 11 CF 1C 16 1D 43 1C 3E FE
```

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20F8: 1E E2 1C 8B 1B C1 15 08 4F
2100: 09 ED 0C 20 58 FC 20 22 DE
2108: 0B 4C 75 08 AD C8 25 49 36
2110: FF 8D C8 25 60 2C 00 C0 95
2118: 10 0B AD 00 C0 8D 10 C0 F7
2120: 29 7F C9 FF 60 A9 00 60 1A
2128: A5 FF F0 07 48 A9 00 85 3A
2130: FF 68 60 20 12 09 F0 FB 2D
2138: 60 20 F2 EB A5 A0 A4 A1 6A
2140: 60 85 FC 84 FB 20 6F 09 44
2148: 20 80 FE A9 00 85 28 85 21
2150: 24 85 25 A9 04 85 29 A0 6E
2158: 00 B1 FB F0 06 20 ED FD 20
2160: C8 D0 F6 60 A2 32 9D 66 9F
2168: 25 CA D0 FA A9 28 8D 99 5C
2170: 25 60 A0 00 A9 20 99 00 72
2178: 04 C8 C0 28 D0 F6 60 AD 5A
2180: 01 04 C9 10 D0 0A AD 0A 92
2188: 04 C9 02 F0 03 4C 94 09 0A
2190: A9 23 A0 A4 20 3E 09 38 13
2198: 20 02 20 90 03 4C 32 0F 35
21A0: 4C 40 0F 09 80 8D 80 02 C8
21A8: A9 3C 8D 81 02 A2 76 A9 C9
21B0: A0 9D 81 02 CA D0 F8 A0 27
21B8: 01 D0 02 A0 00 B9 80 02 E3
21C0: 8D AC 25 A9 DF 99 80 02 9C
21C8: 20 AB 0A 20 12 09 D0 16 B5
21D0: EE AB 25 10 08 A9 DF 99 5B
21D8: 80 02 4C C5 09 AD AC 25 3F
21E0: 99 80 02 4C C5 09 09 80 F9
21E8: 8D AB 25 AD AC 25 99 80 0A
21F0: 02 AD AB 25 AE 95 0A DD 25
21F8: 95 0A F0 2C CA D0 F8 C9 BE
2200: A0 90 BA 8C AC 25 CE AC 1D
2208: 25 A2 77 BD 80 02 C9 3C 2E
2210: F0 AB CA BD 80 02 9D 81 B5
2218: 02 CA EC AC 25 D0 F4 AD 7C
2220: AB 25 99 80 02 C8 D0 95 29
2228: CA 8A 0A AA BD 9E 0A 48 25
2230: BD 9D 0A 48 60 A0 00 B9 BF
2238: 80 02 C9 3C F0 08 29 7F B3
2240: 99 00 03 C8 D0 F1 A9 00 DF
2248: 99 00 03 8C 9C 25 60 AD 6A
2250: D2 22 F0 20 C0 00 F0 01 8F
2258: 88 4C BA 09 AD D2 22 F0 C9
2260: 13 B9 80 02 C9 3C F0 F1 DF
2268: C8 4C BA 09 AD D2 22 F0 F9
2270: 03 4C BA 09 AD AB 25 29 C0
2278: 7F 85 FF 4C 32 0A C0 00 DD
2280: F0 D7 88 98 AA BD 81 02 1F
2288: 9D 80 02 E8 C9 3C D0 F5 61
2290: A9 A0 9D 80 02 4C BA 09 4D
2298: 07 8D 9B 8A 8B 88 95 FF 89
22A0: 31 0A 7A 0A 68 0A 68 0A 36
22A8: 4B 0A 58 0A 7A 0A A2 00 02
22B0: BD 80 02 9D 80 04 BD A8 46
22B8: 02 9D 00 05 BD D0 02 9D 88
22C0: 80 05 E8 E0 28 D0 E9 60 6A
22C8: A9 23 A0 C8 20 3E 09 20 77
22D0: 25 09 C9 59 D0 03 20 D9 65
22D8: 0A 4C 7C 09 20 FA 0A A9 FF
22E0: 09 20 61 09 20 22 0B 20 2E
22E8: 88 0D A9 2C 8D 1C 23 A9 79
22F0: 00 8D 1B 23 A5 6B 85 08 1C
22F8: A5 6C 85 09 60 AD 5F 25 0A
2300: 85 FB AD 60 25 85 FC A0 9D
2308: 00 98 91 FB C8 D0 FB E6 CE
2310: FC A6 FC EC 62 25 D0 F2 29
2318: A9 01 8D 64 25 8D 65 25 BA
2320: 85 1D 85 1E 60 20 28 0B E1
2328: 4C B0 0B A0 05 8C AB 25 03
2330: B9 EB 22 85 28 B9 D3 22 DC
2338: 85 29 A0 00 AE 65 25 A9 9E
2340: 00 8D 99 25 8D 9A 25 F8 89
2348: AD 99 25 18 69 01 8D 99 F5
2350: 25 AD 9A 25 69 00 8D 9A 3B
2358: 25 CA D0 EC D8 A2 00 20 3E
2360: 8D 0B F8 AD 99 25 18 69 25
2368: 01 8D 99 25 AD 9A 25 69 A3
2370: 00 8D 9A 25 D8 EE AB 25 BE
2378: AC AB 25 B9 EB 22 85 28 5B
2380: B9 D3 22 85 29 A0 00 E8 E9
2388: E0 12 D0 D3 20 8D 0B 60 C8
2390: AD 9A 25 18 69 30 91 28 D1
2398: C8 AD 99 25 29 F0 4A 4A 20
23A0: 4A 4A 18 69 30 91 28 C8 19
23A8: AD 99 25 29 0F 18 69 30 3F
23B0: 91 28 60 A0 04 B9 EB 22 E0
23B8: 85 28 B9 D3 22 85 29 A0 5A
23C0: 00 A9 20 91 28 C8 91 28 3E
23C8: C8 91 28 C8 AE 64 25 A9 64
23D0: 00 8D 63 25 BD 66 25 8E 99
23D8: 99 25 4A 69 00 AA CA A9 FE
23E0: 20 91 28 C8 CA D0 FA AD 6A
23E8: 99 25 0A AA BD 1D 23 29 03
23F0: 3F 91 28 C8 BD 1E 23 29 A2
23F8: 3F 91 28 C8 AE 99 25 BD B8
2400: 66 25 4A AA CA CA A9 20 AD
2408: 91 28 C8 CA 10 FA AE 99 4C
2410: 25 BD 66 25 18 6D 63 25 DB
2418: 8D 63 25 E8 BD 66 25 18 1D
2420: 6D 63 25 C9 25 90 AD CA CA
2428: 8E A2 25 A9 20 C0 28 D0 C4
2430: 01 60 91 28 C8 C0 28 D0 30
2438: F9 60 20 A0 09 AD 00 03 A5
2440: F0 3F C9 3D F0 26 AE C4 20
2448: 08 DD C4 08 F0 07 CA D0 2F
2450: F8 A9 01 D0 19 AD 9C 25 8A
2458: C9 25 B0 25 A0 00 A9 03 92
2460: 20 81 0C 20 B7 00 D0 E9 E5
2468: A9 00 F0 02 A9 02 8D 9B CF
2470: 25 AD 1C 23 8D 9D 25 18 B1
2478: 20 02 20 20 62 20 20 3E 69
2480: 1C 4C 7C 08 85 B9 84 B8 CE
2488: 20 B7 00 4C 4A EC A2 32 11
2490: A9 00 8D A8 25 BD 66 25 FB
2498: 18 6D A8 25 8D A8 25 C9 D2
24A0: 25 B0 03 CA D0 EF E8 E8 B5
24A8: 8E AC 25 60 A9 00 2C C9 7D
24B0: 25 30 03 AD 61 C0 0D C8 C3
24B8: 25 8D C7 25 A0 0D A9 24 F2
24C0: 20 3E 09 20 25 09 C9 4C F8
24C8: F0 0F C9 43 F0 0F C9 52 64
24D0: F0 03 4C 85 0D A2 0C D0 10
24D8: 06 A2 08 D0 02 A2 04 AD 2B
24E0: 1C 23 29 F0 8D AB 25 8A 24
24E8: 0D AB 25 8D AB 25 4C 2F D9
24F0: 0D A9 00 2C C9 25 30 03 33
24F8: AD 61 C0 0D C8 25 8D C7 17
2500: 25 A0 36 A9 24 20 3E 09 8D
2508: 20 76 10 F0 7B A0 00 A9 19
2510: 02 20 81 0C 20 36 09 C9 0A
2518: 00 D0 6D C0 10 B0 69 AD 14
2520: 1C 23 29 0C 8D AB 25 98 25
2528: 0A 0A 0A 0A 0D AB 25 8D CA
2530: AB 25 AD C7 25 10 41 AD 65
2538: AB 25 8D 1C 23 AD 5F 25 C8
2540: 85 1B AD 60 25 85 1C A0 E7
2548: 01 B1 1B F0 11 85 1A 88 4D
2550: B1 1B 85 19 B1 19 29 03 C3
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2558: ØD 1C 23 91 19 C8 A5 1B FF
2560: 18 69 Ø2 85 1B A5 1C 69 BA
2568: Ø0 85 1C A5 1C C5 6C DØ 93
2570: D8 38 2Ø Ø2 2Ø 4C 85 ØD A3
2578: 38 2Ø Ø2 2Ø 9Ø ØA AØ Ø0 17
2580: AD AB 25 ØD 9B 25 91 19 AF
2588: 4C 7C Ø9 A5 1D 8D AØ 25 19
2590: A5 1E 8D A1 25 A9 Ø3 8D 64
2598: 63 25 AE 64 25 86 1D AC 24
25A0: 65 25 84 1E 98 18 69 13 64
25A8: 8D 9E 25 BD 66 25 8D A8 6D
25B0: 25 A9 FF EC AØ 25 DØ Ø7 Ø9
25B8: CC A1 25 DØ Ø2 A9 3F 8D 46
25C0: A3 25 98 18 69 Ø5 38 ED 78
25C8: 65 25 A8 B9 D3 22 85 29 1B
25D0: B9 EB 22 85 28 38 2Ø Ø2 F3
25D8: 2Ø BØ Ø5 A9 AØ 4C 67 ØE AD
25E0: AD 9B 25 FØ 7Ø C9 Ø2 FØ 3C
25E8: 6C AD A8 25 38 ED 9C 25 14
25F0: AA E8 3Ø 32 E8 AD 9D 25 52
25F8: 29 ØC C9 Ø8 FØ 28 BØ Ø5 23
2600: 8A 4A FØ 22 AA 8E A4 25 62
2608: A9 AØ 2D A3 25 AC 63 25 F8
2610: 91 28 C8 CA DØ FA 8C A5 26
2618: 25 AD A8 25 38 ED A4 25 B1
2620: AA AØ Ø2 4C 2E ØE AE A8 9E
2628: 25 AD 63 25 8D A5 25 AØ 1F
2630: Ø2 B1 19 8C A4 25 AC A5 8E
2638: 25 Ø9 8Ø 2D A3 25 91 28 39
2640: AC A4 25 EE A5 25 CA FØ E7
2648: Ø9 C8 CC 9C 25 DØ E2 2Ø Ø1
2650: A9 ØE 4C 76 ØE 2Ø 4E ØF 82
2658: AE 9C 25 CA CA CA EC A8 78
2660: 25 BØ Ø3 4C E6 ØD A9 2A 79
2668: Ø9 8Ø 2D A3 25 AC 63 25 Ø1
2670: AE A8 25 91 28 C8 CA DØ C6
2678: FA A4 1E A6 1D C8 CC 9E DD
2680: 25 FØ Ø5 84 1E 4C A8 ØD Ø5
2688: AC 65 25 84 1E AD A8 25 8F
2690: 18 6D 63 25 8D 63 25 E8 3Ø
2698: 86 1D EØ 33 FØ 27 BD 66 C4
26A0: 25 18 6D 63 25 C9 28 BØ BA
26A8: 1C 4C A8 ØD EØ Ø0 FØ 14 F8
26B0: AD 63 25 18 6D A8 25 A8 D3
26B8: 88 A9 AØ 2D A3 25 91 28 97
26C0: 88 CA DØ FA 6Ø A9 28 38 FF
26C8: ED 63 25 8D A8 25 AØ Ø5 82
26D0: 84 1E B9 D3 22 85 29 B9 8E
26D8: EB 22 85 28 AC 63 25 AE C2
26E0: A8 25 A9 AØ 91 28 C8 CA 93
26E8: DØ FA E6 1E A4 1E CØ 18 52
26F0: DØ EØ AD AØ 25 85 1D AD C4
26F8: A1 25 85 1E AØ Ø0 A9 AØ EA
2700: 99 8Ø Ø2 C8 CØ 78 DØ F8 8A
2708: 38 2Ø Ø2 2Ø 9Ø 35 AØ Ø2 59
2710: A2 Ø0 AD 9B 25 C9 Ø2 DØ 44
2718: Ø9 AC 9C 25 B1 19 8D 9C A5
2720: 25 C8 B1 19 Ø9 8Ø 9D 8Ø Ø1
2728: Ø2 E8 C8 CC 9C 25 DØ F2 A5
2730: A9 3C 9D 8Ø Ø2 AE 9B 25 45
2738: BD 18 23 29 3F 8D 27 Ø4 E4
2740: 4C AB ØA A9 2Ø 8D 27 Ø4 Ø5
2748: A9 3C 8D 8Ø Ø2 2Ø AB ØA 26
2750: 6Ø A9 2Ø 8D Ø0 Ø2 AØ Ø2 61
2758: B1 19 C9 2A FØ F2 AD 9D ED
2760: 25 4A 4A 4A 4A 8D A6 25 BC
2768: A2 FF C9 ØF FØ E2 B1 19 C1
2770: C9 2E DØ Ø9 AE A6 25 FØ 25
2778: 1Ø E8 8E Ø0 Ø2 99 FF Ø1 52
2780: C8 CC 9C 25 FØ Ø3 CA DØ 46
2788: E5 AD A6 25 FØ 1E EØ Ø0 1E
2790: FØ 1A AD Ø0 Ø2 C9 2Ø DØ DB
2798: ØA A9 2E 99 FF Ø1 C8 AE F9
27A0: A6 25 E8 A9 3Ø 99 FF Ø1 2C
27A8: C8 CA DØ F9 A9 2Ø 8D Ø0 BØ
27B0: Ø2 CC 9C 25 FØ ØC BØ 3F 71
27B8: B1 19 C9 2E FØ Ø8 C9 35 B2
27C0: BØ ØC C8 4C F4 ØF C8 B1 6F
27C8: 19 C9 35 9Ø 2A 88 98 C8 33
27D0: AA CA CA BD Ø0 Ø2 C9 2E 26
27D8: FØ ØB 9Ø ØC C9 39 DØ 14 1E
27E0: A9 3Ø 9D Ø0 Ø2 CA 1Ø EB ØB
27E8: CA 9D Ø0 Ø2 E8 A9 31 9D 12
27F0: Ø0 Ø2 DØ Ø3 FE Ø0 Ø2 88 8E
27F8: 8C 9C 25 AD Ø0 Ø2 C9 2Ø EF
2800: DØ Ø9 A9 Ø1 85 1A A9 FF 28
2808: 85 19 6Ø A9 Ø1 85 1A A9 Ø4
2810: FE 85 19 EE 9C 25 6Ø A9 37
2818: Ø0 2C C9 25 3Ø Ø3 AD 61 49
2820: CØ ØD C8 25 8D C7 25 A9 FE
2828: 23 AØ E1 2Ø 3E Ø9 2Ø 76 3D
2830: 1Ø AØ Ø0 A9 Ø2 2Ø 81 ØC EA
2838: 2Ø 36 Ø9 C9 Ø0 DØ 33 CØ 4E
2840: Ø4 9Ø 2F CØ 25 BØ 2B A5 9Ø
2848: 1D 8D 64 25 AD C7 25 1Ø 5Ø
2850: Ø7 98 2Ø 61 Ø9 4C 5B 1Ø A4
2858: 98 A6 1D 9D 66 25 2Ø 8B AF
2860: ØC A5 1D CD AC 25 9Ø Ø7 C2
2868: AC AC 25 88 8C 64 25 2Ø C7
2870: BØ ØB 4C 7C Ø9 A9 Ø1 DØ EE
2878: Ø2 A9 Ø0 8D A7 25 AØ Ø0 2Ø
2880: A9 1F 2Ø ED FD A9 88 2Ø 18
2888: ED FD 2Ø 25 Ø9 C9 ØD FØ 2Ø
2890: 3F C9 Ø8 FØ 26 C9 7F FØ 4B
2898: 22 C9 2Ø 9Ø ED AE A7 25 18
28A0: DØ Ø8 C9 3Ø 9Ø E4 C9 3A 7D
28A8: BØ EØ A6 24 EØ 26 FØ DA FC
28B0: 99 Ø0 Ø2 Ø9 8Ø 2Ø ED FD FC
28B8: C8 DØ C5 CØ Ø0 FØ CB A9 6B
28C0: AØ 2Ø ED FD A9 88 2Ø ED A4
28C8: FD 2Ø ED FD 88 4C 7D 1Ø 3E
28D0: A9 AØ 2Ø ED FD A9 Ø0 99 31
28D8: Ø0 Ø2 8C A6 25 AD Ø0 Ø2 87
28E0: 6Ø A5 1E C9 C8 FØ 12 E6 4Ø
28E8: 1E AD 65 25 18 69 12 C5 Ø3
28F0: 1E BØ Ø6 EE 65 25 2Ø 28 54
28F8: ØB 6Ø A5 1E C9 Ø1 FØ 1Ø C1
2900: C6 1E AC 65 25 88 C4 1E 1C
2908: 9Ø Ø6 CE 65 25 2Ø 28 ØB 59
2910: 6Ø A5 1D C9 32 FØ 23 E6 BE
2918: 1D AC A2 25 C4 1D BØ 1A EØ
2920: EE 64 25 AE 64 25 A9 Ø0 9D
2928: 18 7D 66 25 E8 C9 25 9Ø 4E
2930: F7 CA CA E4 1D 9Ø E9 2Ø F7
2938: BØ ØB 6Ø A5 1D C9 Ø1 FØ ØF
2940: 1Ø C6 1D AC 64 25 88 C4 48
2948: 1D 9Ø Ø6 CE 64 25 2Ø BØ A3
2950: ØB 6Ø A9 23 AØ E8 2Ø 3E CE
2958: Ø9 2Ø 72 1Ø A9 Ø1 85 B9 9C
2960: A9 FF 85 B8 2Ø B1 Ø0 9Ø 1C
2968: 4E 38 E9 41 3Ø 49 FØ Ø6 CF
2970: C9 Ø2 BØ 43 A9 1A 8D AB EE
2978: 25 2Ø B1 Ø0 9Ø 39 38 E9 5F
2980: 4Ø 3Ø 34 FØ 32 C9 1B BØ 34
2988: 2E 18 6D AB 25 C9 33 BØ C7
2990: 26 8D AB 25 2Ø B1 Ø0 BØ 99
2998: 1E 2Ø 4A EC 2Ø 36 Ø9 C9 CF
29A0: Ø0 DØ 14 CØ Ø0 FØ 1Ø CØ 5A
29A8: C9 BØ ØC CØ B7 9Ø ØB A9 59
29B0: B6 8D 65 25 4C BA 11 4C 7C
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29B8: 7C 09 8C 65 25 84 1E 20 0B
29C0: 8B 0C AD AB 25 CD AC 25 2B
29C8: 90 0A AC AC 25 88 8C 64 0F
29D0: 25 4C D4 11 8D 64 25 85 42
29D8: 1D 20 22 0B 4C 7C 09 AD CA
29E0: 64 25 C5 1D D0 17 AD 65 DC
29E8: 25 C5 1E D0 10 A9 01 8D C6
29F0: 64 25 85 1D 8D 65 25 85 13
29F8: 1E 20 22 0B 60 AD 64 25 FE
2A00: 85 1D AD 65 25 85 1E 60 46
2A08: 20 B1 00 8D BF 25 20 B1 36
2A10: 00 8D C0 25 20 B1 00 8D 87
2A18: C1 25 20 B1 00 C9 28 F0 1E
2A20: 03 4C 88 22 AE 6A 12 AD 2D
2A28: BF 25 DD 6A 12 F0 06 CA 33
2A30: D0 F5 4C 88 22 AD C0 25 EA
2A38: DD 76 12 F0 02 D0 F0 AD 4D
2A40: C1 25 DD 82 12 D0 E8 8E D6
2A48: 99 25 E0 0B B0 0C 8A 48 92
2A50: A9 00 48 4C 5D 21 68 8D 15
2A58: 99 25 20 B1 00 AE 99 25 F4
2A60: CA 8A 0A AA BD 90 12 48 45
2A68: BD 8F 12 48 60 0C 41 41 3D
2A70: 43 45 49 4C 53 53 53 54 88
2A78: 53 41 42 54 4F 58 4E 4F 1C
2A80: 47 49 51 41 55 56 53 4E 02
2A88: 53 50 54 47 4E 4E 52 4E 38
2A90: 4D 45 AE EB 9D F0 E9 EF E5
2A98: 08 EF 22 EC 40 E9 8F EB B4
2AA0: F0 EF 8C EE 39 F0 A9 13 DD
2AA8: 11 14 20 64 13 8E C2 25 52
2AB0: 8C C4 25 20 B7 00 C9 3A AE
2AB8: D0 3F 20 B1 00 20 64 13 C0
2AC0: 8E C3 25 8C C5 25 20 B7 75
2AC8: 00 C9 29 D0 2C 20 B1 00 07
2AD0: AE C2 25 CA EC C3 25 90 CF
2AD8: 03 4C 88 22 AC C4 25 88 40
2AE0: CC C5 25 90 03 4C 88 22 37
2AE8: E8 C8 A5 1D 8D A9 25 A5 6D
2AF0: 1E 8D AA 25 86 1D 84 1E 2F
2AF8: 60 4C 88 22 18 20 02 20 29
2B00: 90 42 A0 00 B1 19 29 03 8A
2B08: C9 01 F0 38 C8 B1 19 8D F1
2B10: AC 25 A2 00 C8 B1 19 9D 37
2B18: 00 02 E8 C8 CC AC 25 D0 CC
2B20: F4 A5 B8 48 A5 B9 48 A9 44
2B28: 00 9D 00 02 A9 02 A0 00 9C
2B30: 20 81 0C 68 85 B9 68 85 68
2B38: B8 A5 1D CD C3 25 F0 15 7E
2B40: E6 1D 18 60 AD A9 25 85 3E
2B48: 1D AD AA 25 85 1E 18 20 35
2B50: 02 20 4C 88 22 AD C2 25 34
2B58: 85 1D A5 1E CD C5 25 F0 10
2B60: 04 E6 1E 18 60 38 60 A2 FE
2B68: 00 20 B7 00 C9 41 F0 06 F8
2B70: C9 42 D0 D0 A2 1A 8E AB A9
2B78: 25 20 B1 00 C9 41 90 C4 D8
2B80: C9 5B B0 C0 38 E9 40 18 B6
2B88: 6D AB 25 C9 33 B0 B5 8D 17
2B90: AB 25 20 B1 00 B0 AD 20 63
2B98: 4A EC 20 36 09 C9 00 D0 F6
2BA0: A3 C0 00 F0 9F C0 C9 B0 4C
2BA8: 9B AE AB 25 60 A9 01 8D 79
2BB0: 99 25 A9 00 8D 9A 25 20 93
2BB8: A7 12 20 F9 12 B0 47 20 0D
2BC0: 72 EB A5 A2 48 A5 A1 48 8E
2BC8: A5 A0 48 A5 9F 48 A5 9E 85
2BD0: 48 A5 9D 48 EE 99 25 D0 E5
2BD8: 03 EE 9A 25 20 F9 12 08 27
2BE0: 68 8D AB 25 68 85 A5 68 A3
2BE8: 85 A6 68 85 A7 68 85 A8 A3
2BF0: 68 85 A9 68 85 AA 45 A2 9C
2BF8: 85 AB A5 9D 20 C1 E7 AD 11
2C00: AB 25 48 28 90 B9 AD A9 73
2C08: 25 85 1D AD AA 25 85 1E E5
2C10: 18 20 02 20 60 20 AA 13 AA
2C18: A2 06 B5 9C 95 A4 CA D0 69
2C20: F9 AD 9A 25 AC 99 25 20 BC
2C28: F2 E2 A5 AA 45 A2 85 AB 7D
2C30: A5 9D 20 2E 22 60 20 58 D4
2C38: FC A9 01 8D C6 25 A9 00 90
2C40: 2C C9 25 30 03 AD 61 C0 1B
2C48: 0D C8 25 30 03 4C A2 14 A3
2C50: A9 24 A0 F9 20 3E 09 20 66
2C58: 25 09 C9 53 F0 0B C9 44 7F
2C60: F0 0E C9 50 F0 21 4C AB 43
2C68: 15 A9 03 8D C6 25 D0 35 90
2C70: A9 00 8D C6 25 A0 1D A9 4B
2C78: 25 20 3E 09 20 72 10 20 CE
2C80: E6 1A 90 21 4C 9E 15 A9 A7
2C88: 24 A0 F2 20 3E 09 20 25 F6
2C90: 09 38 E9 30 C9 00 B0 03 6E
2C98: 4C AB 15 C9 08 90 03 4C 16
2CA0: AB 15 8D C6 25 A9 24 A0 EA
2CA8: E6 20 3E 09 20 84 FE AD 93
2CB0: C6 25 F0 14 C9 03 D0 0D 1E
2CB8: AD 05 C3 18 6D 07 C3 C9 FB
2CC0: 50 D0 05 A9 03 20 95 FE 73
2CC8: A5 1D 8D C3 25 8D A0 25 EE
2CD0: A5 1E 8D C5 25 8D A1 25 59
2CD8: A9 01 85 1D 85 1E A9 8D 4E
2CE0: 20 B4 15 A6 1D BD 66 25 55
2CE8: 8D A8 25 AA A9 00 9D 00 0A
2CF0: 03 CA A9 20 9D 00 03 CA 72
2CF8: 10 FA 38 20 02 20 90 58 2B
2D00: AD 9B 25 C9 01 D0 23 AD 98
2D08: A8 25 38 ED 9C 25 AA E8 9D
2D10: 30 14 E8 AD 9D 25 29 0C 5F
2D18: C9 08 F0 0A B0 27 8A 4A 99
2D20: F0 04 AA 4C 42 15 A2 00 B9
2D28: F0 1B 20 4E 0F AE 9C 25 3C
2D30: CA CA CA EC A8 25 90 CF 95
2D38: AE A8 25 A9 2A 9D FF 02 1D
2D40: CA D0 FA F0 13 A0 02 B1 73
2D48: 19 9D 00 03 E8 C8 EC A8 B3
2D50: 25 F0 05 CC 9C 25 D0 EF F1
2D58: A2 00 BD 00 03 F0 08 09 B0
2D60: 80 20 B4 15 E8 D0 F3 A5 03
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2D78: F0 0E E6 1E A9 01 85 1D 07
2D80: A9 8D 20 B4 15 4C E0 14 12
2D88: A9 8D 20 B4 15 AD C6 25 7C
2D90: C9 03 D0 03 20 25 09 A9 2C
2D98: 00 20 95 FE AD C6 25 D0 41
2DA0: 03 20 17 1B AD A0 25 85 D8
2DA8: 1D AD A1 25 85 1E 20 58 C0
2DB0: FC 20 22 0B 4C 7C 09 48 35
2DB8: AD C6 25 F0 04 68 4C ED 97
2DC0: FD 68 4C 2B 1B A9 00 2C 1C
2DC8: C9 25 30 03 AD 61 C0 0D 09
2DD0: C8 25 8D AF 25 A9 00 8D E2
2DD8: B0 25 A5 1D 8D B1 25 A5 7E
2DE0: 1E 8D B2 25 4C 06 16 4C 49
2DE8: 7C 09 A9 00 2C C9 25 30 FB
2DF0: 03 AD 61 C0 0D C8 25 8D D3
2DF8: AF 25 A9 01 8D B0 25 A5 D8
2E00: 1D 8D B1 25 A5 1E 8D B2 4A
2E08: 25 20 41 16 AD A0 25 8D 50
2E10: B5 25 AD A1 25 8D B6 25 52
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2E18: 20 4B 16 AE B1 25 CA EC A9
2E20: B5 25 D0 13 AE B2 25 CA 3D
2E28: EC B6 25 D0 0A A9 24 A0 38
2E30: 62 20 3E 09 20 3D 18 AD F1
2E38: B3 25 85 1D AD B4 25 85 4A
2E40: 1E 4C 7C 09 A9 24 A0 C1 BF
2E48: 20 3E 09 4C 52 16 A9 24 8C
2E50: A0 99 20 3E 09 20 88 0D 32
2E58: 20 25 09 AE 86 16 DD 86 E8
2E60: 16 F0 06 CA D0 F8 4C 52 C6
2E68: 16 CA 8A 0A AA A9 16 48 E4
2E70: A9 51 48 BD 8E 16 48 BD F5
2E78: 8D 16 48 60 68 68 A5 1D 7D
2E80: 8D B3 25 A5 1E 8D B4 25 45
2E88: 60 06 00 0B 0A 08 15 0D EE
2E90: DB 11 F6 10 DD 10 37 11 AD
2E98: 0D 11 78 16 AD B9 25 C9 98
2EA0: 33 B0 5B AD BA 25 C9 C9 D0
2EA8: B0 54 AD B7 25 85 1D AD CA
2EB0: B8 25 85 1E 38 20 02 20 AB
2EB8: 90 45 A0 02 AD 9B 25 C9 D2
2EC0: 02 D0 09 AC 9C 25 B1 19 34
2EC8: 8D 9C 25 C8 A2 00 B1 19 D5
2ED0: 9D 00 03 E8 C8 CC 9C 25 C2
2ED8: D0 F4 A9 00 9D 00 03 8E 91
2EE0: 9C 25 20 1E 17 AD B0 25 B0
2EE8: D0 03 20 0C 17 AD B9 25 3B
2EF0: 85 1D AD BA 25 85 1E 18 4C
2EF8: 20 02 20 20 62 20 60 AD ED
2F00: B9 25 85 1D AD BA 25 85 2F
2F08: 1E 18 20 02 20 90 EF 20 E2
2F10: 6E 1E 18 20 02 20 A9 00 16
2F18: A8 91 1B C8 91 1B 4C FB AC
2F20: 16 AD AF 25 30 01 60 AD 31
2F28: 9B 25 C9 02 F0 01 60 AD F0
2F30: B9 25 38 ED B7 25 8D BD C5
2F38: 25 AD BA 25 38 ED B8 25 4E
2F40: 8D BE 25 A2 00 8E 9A 25 78
2F48: BD 00 03 9D 80 02 E8 EC 8A
2F50: 9C 25 D0 F4 A9 00 9D 80 B8
2F58: 02 A9 80 85 B8 A9 02 85 80
2F60: B9 A9 00 85 FB A9 03 85 70
2F68: FC 20 B7 00 20 30 18 20 56
2F70: B1 00 C9 00 D0 03 4C 25 31
2F78: 18 C9 40 D0 03 4C 10 18 EB
2F80: 90 EA C9 43 B0 E6 A2 00 B5
2F88: C9 42 D0 02 A2 1A 8E 99 CA
2F90: 25 20 B1 00 C9 41 90 66 9A
2F98: C9 5B B0 62 38 E9 40 18 F0
2FA0: 6D 99 25 C9 33 B0 57 18 80
2FA8: 6D BD 25 A2 41 C9 1B 90 F3
2FB0: 05 A2 42 38 E9 1A 18 69 57
2FB8: 40 8D 99 25 8A 20 30 18 6D
2FC0: AD 99 25 20 30 18 20 B1 D6
2FC8: 00 B0 33 20 4A EC 20 36 38
2FD0: 09 C9 00 D0 29 C0 00 F0 70
2FD8: 25 C0 C9 B0 21 98 18 6D 47
2FE0: BE 25 A8 A9 00 20 F2 E2 E0
2FE8: 20 34 ED A2 00 BD 00 01 44
2FF0: F0 06 20 30 18 E8 D0 F5 4C
2FF8: 20 B7 00 4C 6F 17 A2 00 37
3000: BD 80 02 F0 06 9D 00 03 58
3008: E8 D0 F5 A9 00 9D 00 03 E3
3010: 4C 2F 18 20 30 18 20 B1 3B
3018: 00 20 30 18 20 B1 00 20 EF
3020: 30 18 20 B1 00 4C 69 17 D8
3028: AC 9A 25 8C 9C 25 A9 00 BF
3030: 91 FB 60 AC 9A 25 C0 78 92
3038: F0 05 91 FB EE 9A 25 60 D0
3040: AD B5 25 38 ED B1 25 18 A5
3048: 6D A0 25 8D BB 25 AD B6 89
3050: 25 38 ED B2 25 18 6D A1 40
3058: 25 8D BC 25 AD B2 25 CD E8
3060: A1 25 B0 03 4C 00 19 AD 63
3068: B1 25 CD A0 25 90 4A AD 5C
3070: B1 25 8D B7 25 AD B2 25 8A
3078: 8D B8 25 AD A0 25 8D B9 BB
3080: 25 AD A1 25 8D BA 25 20 27
3088: 99 16 AD B7 25 CD B5 25 5D
3090: F0 08 EE B7 25 EE B9 25 42
3098: D0 ED AD B8 25 CD B6 25 11
30A0: F0 14 EE B8 25 EE BA 25 67
30A8: AD B1 25 8D B7 25 AD A0 18
30B0: 25 8D B9 25 D0 D1 4C 99 90
30B8: 19 AD B5 25 8D B7 25 AD 5D
30C0: BB 25 8D B9 25 AD B2 25 FF
30C8: 8D B8 25 AD A1 25 8D BA 15
30D0: 25 20 99 16 AD B7 25 CD C4
30D8: B1 25 F0 08 CE B7 25 CE 68
30E0: B9 25 D0 ED AD B8 25 CD C8
30E8: B6 25 F0 CA EE B8 25 EE 4C
30F0: BA 25 AD B5 25 8D B7 25 FC
30F8: AD BB 25 8D B9 25 D0 D1 72
3100: 4C 99 19 AD B1 25 CD A0 4B
3108: 25 90 4A AD B1 25 8D B7 3A
3110: 25 AD B6 25 8D B8 25 AD E0
3118: A0 25 8D B9 25 AD BC 25 DF
3120: 8D BA 25 20 99 16 AD B7 D6
3128: 25 CD B5 25 F0 08 EE B7 D6
3130: 25 EE B9 25 D0 ED AD B8 BC
3138: 25 CD B2 25 F0 14 CE B8 77
3140: 25 CE BA 25 AD B1 25 8D 9E
3148: B7 25 AD A0 25 8D B9 25 87
3150: D0 D1 4C 99 19 AD B5 25 C2
3158: 8D B7 25 AD BB 25 8D B9 36
3160: 25 AD B6 25 8D B8 25 AD 31
3168: BC 25 8D BA 25 20 99 16 C2
3170: AD B7 25 CD B1 25 F0 08 25
3178: CE B7 25 CE B9 25 D0 ED B3
3180: AD B8 25 CD B2 25 F0 14 89
3188: CE B8 25 CE BA 25 AD B5 8D
3190: 25 8D B7 25 AD BB 25 8D 66
3198: B9 25 D0 D1 4C 44 1C A9 AD
31A0: 24 A0 01 20 3E 09 20 72 28
31A8: 10 D0 03 4C 7C 09 20 E6 9B
31B0: 1A 90 03 4C 40 1B A9 FF 2B
31B8: 20 2B 1B A9 FF 20 2B 1B E5
31C0: A5 08 20 2B 1B A5 09 20 50
31C8: 2B 1B A0 32 B9 66 25 20 90
31D0: 2B 1B 88 D0 F7 AD 5F 25 08
31D8: 85 1B AD 60 25 85 1C A0 98
31E0: 01 B1 1B F0 16 A5 1B 20 40
31E8: 2B 1B A5 1C 20 2B 1B 88 8A
31F0: B1 1B 20 2B 1B C8 B1 1B 24
31F8: 20 2B 1B A5 1B 18 69 02 02
3200: 85 1B A5 1C 69 00 85 1C D6
3208: A5 1C C5 6C D0 D1 A9 FF E6
3210: 20 2B 1B A5 6B 85 1B A5 5A
3218: 6C 85 1C A0 00 B1 1B 20 BE
3220: 2B 1B C8 D0 F8 E6 1C A5 48
3228: 1C C5 09 90 F0 F0 EE 20 7F
3230: 17 1B 4C BB 1A A9 24 A0 8C
3238: 07 20 3E 09 20 72 10 D0 3C
3240: 03 4C 7C 09 20 FA 1A 90 0B
3248: 03 4C 40 1B 20 1E 1B C9 74
3250: FF D0 60 20 1E 1B C9 FF E7
3258: D0 59 20 FA 0A 20 1E 1B 57
3260: 85 08 20 1E 1B 85 09 A0 11
3268: 32 20 1E 1B 99 66 25 88 9C
3270: D0 F7 20 1E 1B C9 FF F0 12
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3278: 18 85 1B 20 1E 1B 85 1C 34
3280: 20 1E 1B A0 00 91 1B 20 86
3288: 1E 1B A0 01 91 1B 4C 6F E7
3290: 1A A5 6B 85 1B A5 6C 85 FE
3298: 1C A0 00 20 1E 1B 91 1B D0
32A0: C8 D0 F8 E6 1C A5 1C C5 A0
32A8: 09 90 F0 F0 EE 20 17 1B 24
32B0: 4C BB 1A 20 17 1B A9 25 0D
32B8: A0 4A 4C 3E 09 60 B0 08 A0
32C0: A9 25 A0 27 20 3E 09 60 36
32C8: 8D 00 02 20 6F 09 A9 00 29
32D0: 85 24 85 28 A9 04 85 29 C5
32D8: 20 80 FE A9 25 A0 31 20 16
32E0: 3E 09 AD 00 02 20 DA FD A0
32E8: 60 20 04 1B 20 00 BF C1 F9
32F0: 62 1B 20 00 BF C0 65 1B 38
32F8: B0 0C 4C FD 1A 20 04 1B 96
3300: 20 00 BF C8 71 1B 60 AC 60
3308: A6 25 B9 00 02 99 01 02 BC
3310: 88 10 F7 AD A6 25 8D 00 7D
3318: 02 60 20 00 BF CC 7F 1B E6
3320: 60 98 48 8A 48 20 00 BF 11
3328: CA 81 1B 4C 38 1B 8D 00 C5
3330: 02 98 48 8A 48 20 00 BF F1
3338: CB 77 1B 90 0F AA 68 68 2B
3340: 68 68 8A 8D 00 02 20 17 7E
3348: 1B 4C C8 1A 68 AA 68 A8 71
3350: AD 00 02 60 02 60 00 BE 24
3358: 01 00 02 04 01 00 B9 00 3B
3360: 02 00 00 01 01 01 00 02 E5
3368: 07 00 02 C3 04 00 00 01 EF
3370: 00 00 00 00 03 00 02 00 F2
3378: BB 00 04 01 00 02 01 00 57
3380: 00 00 01 01 04 01 00 02 3D
3388: 01 00 00 00 4C C5 1A 20 3D
3390: 58 FC 20 84 FE 20 00 BF E6
3398: C5 51 1B B0 EF A0 00 AD 54
33A0: 00 BE 29 0F 8D 00 02 B9 F6
33A8: 01 BE 99 02 02 C8 CC 00 5F
33B0: 02 D0 F4 C8 8C 00 02 A9 89
33B8: 2F 8D 01 02 20 00 BF C6 A1
33C0: 55 1B B0 C8 20 00 BF C8 84
33C8: 71 1B B0 C0 A9 AF 20 ED 0B
33D0: FD 20 00 BF CA 58 1B B0 D8
33D8: B3 A9 B9 85 FC A9 04 85 2F
33E0: FB A0 00 B1 FB D0 08 C8 84
33E8: B1 FB F0 34 4C 09 1C 8D D4
33F0: 99 25 29 0F AA E8 8E A6 40
33F8: 25 C8 B1 FB 09 80 20 ED 92
3400: FD C8 CC A6 25 D0 F3 A9 9B
3408: 8D 20 ED FD A9 27 18 65 5C
3410: FB 85 FB A5 FC 69 00 85 C4
3418: FC C9 BB F0 B4 4C DE 1B A7
3420: 20 00 BF CC 60 1B A9 24 44
3428: 85 FC A9 54 85 FB 20 54 BD
3430: 09 20 12 09 C9 0D D0 F9 16
3438: 20 58 FC 20 22 0B 4C 7C BA
3440: 09 AD 1B 23 D0 01 60 A9 23
3448: 25 A0 39 20 3E 09 A5 1D 13
3450: 8D A0 25 A5 1E 8D A1 25 36
3458: A9 01 85 1D 85 1E AD 5F B7
3460: 25 85 1B AD 60 25 85 1C B9
3468: A0 01 B1 1B F0 35 85 1A CA
3470: 88 B1 1B 85 19 B1 19 29 30
3478: 03 C9 02 D0 26 38 20 02 76
3480: 20 A2 00 AC 9C 25 B1 19 62
3488: 8D 9C 25 C8 B1 19 9D 00 3D
3490: 03 E8 C8 CC 9C 25 D0 F4 AA
3498: A9 00 9D 00 03 8E 9C 25 3A
34A0: 20 62 20 A5 1B 18 69 02 1E
34A8: 85 1B 90 02 E6 1C E6 1E 60
34B0: A5 1E C9 C9 D0 B2 A9 01 EE
34B8: 85 1E E6 1D A5 1D C9 33 82
34C0: D0 A6 AD A0 25 85 1D AD 22
34C8: A1 25 85 1E 38 20 02 20 44
34D0: 4C 7C 09 20 6E 1E 18 20 DD
34D8: 02 20 A9 00 A8 91 1B C8 0A
34E0: 91 1B 20 3E 1C 60 A9 23 99
34E8: A0 EE 20 3E 09 A9 00 2C 60
34F0: C9 25 30 03 AD 61 C0 0D 3F
34F8: C8 25 30 08 AD 1B 23 49 FE
3500: FF 8D 1B 23 AD 1B 23 C9 4D
3508: 00 F0 06 A9 CE 20 ED FD DA
3510: 60 A9 C6 20 ED FD 20 ED 85
3518: FD 60 EE D2 22 20 B8 09 B0
3520: CE D2 22 AD 00 03 F0 4E 02
3528: C9 3D F0 27 AE C4 08 DD CD
3530: C4 08 F0 08 CA D0 F8 A9 D2
3538: 01 4C 52 1D AD 9C 25 C9 46
3540: 25 B0 33 A0 00 A9 03 20 A6
3548: 81 0C 20 B7 00 D0 E8 A9 B4
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35A8: 8D 99 25 AD AB 25 C9 2D 72
35B0: F0 4C A2 00 A0 00 BD 00 7B
35B8: 02 C9 45 F0 08 E8 C9 2E F3
35C0: F0 F4 C8 D0 F1 88 8C AB 7D
35C8: 25 AD 99 25 38 ED AB 25 AC
35D0: 8D 99 25 A2 01 A0 01 BD 81
35D8: 00 02 E8 C9 2E F0 F8 C9 6E
35E0: 45 F0 06 99 00 02 C8 D0 EE
35E8: EE A9 30 AE 99 25 99 00 BA
35F0: 02 C8 CA D0 F9 A9 00 99 05
35F8: 00 02 8C A6 25 60 CE 99 C1
3600: 25 A2 00 A0 00 BD 00 02 AA
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3610: 06 99 80 02 C8 D0 EE A9 27
3618: 00 99 80 02 A9 2E 8D 00 3C
3620: 02 AE 99 25 A9 30 9D 00 08
3628: 02 CA D0 FA A2 00 AC 99 1A
3630: 25 C8 BD 80 02 99 00 02 99
3638: F0 04 E8 C8 D0 F4 8C A6 E1
3640: 25 60 20 6F 09 A9 04 85 CE
3648: 29 A9 00 85 28 85 24 AD 59
3650: 61 25 38 E5 08 A8 AD 62 BC
3658: 25 E5 09 20 5C 1E 60 20 30
3660: F2 E2 20 34 ED A9 01 85 E3
3668: FC A9 00 85 FB 20 54 09 28
3670: 60 A0 01 B1 1B F0 E7 A9 86
3678: 00 91 1B 88 91 1B B1 19 AA
3680: 29 03 C9 02 D0 09 C8 B1 89
3688: 19 A8 B1 19 4C 8F 1E C8 19
3690: B1 19 85 FB 18 65 19 8D A2
3698: B1 1E A5 19 8D B4 1E A5 CC
36A0: 1A 8D B5 1E 69 00 8D B2 2F
36A8: 1E A5 09 38 ED B2 1E AA 53
36B0: E8 A0 00 B9 FF FF 99 FF 88
36B8: FF C8 D0 F7 EE B2 1E EE 5E
36C0: B5 1E CA D0 EE A5 08 38 4C
36C8: E5 FB 85 08 A5 09 E9 00 7D
36D0: 85 09 AD 5F 25 85 FD AD D6
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Please answer the following questions to help us fill your computing needs.

1. Please let us know. Do you own: / Plan to buy:
   - Apple II+ ☐ 270 / ☐ 271
   - Apple IIc ☐ 272 / ☐ 273
   - Apple IIe ☐ 274 / ☐ 275
   - Apple IIgs ☐ 276 / ☐ 277
   - Apple III ☐ 278 / ☐ 279
   - Macintosh 512 ☐ 280 / ☐ 281
   - Macintosh Plus ☐ 282 / ☐ 283
   - Macintosh SE ☐ 284 / ☐ 285
   - Other _____ (please specify) ☐ 286 / ☐ 287
2. Where do you usually use your Apple computer?
   - At home/home office ☐ 214
   - At a business office ☐ 215
   - Both office and home ☐ 216
   - In the classroom ☐ 217
   - Other _____ 218
3. Do you plan to purchase a personal computer in the next 12 months?
   - Yes ☐ 219
   - No ☐ 220
   - Don't know ☐ 221
4. Do you plan to purchase software in the next 12 months?
   - Yes ☐ 222
   - No ☐ 223
   - Don't know ☐ 224
5. Which of the following peripherals do you own or use? (check all that apply)
   - Disk Drive ☐ 225
   - Joystick (or game peripheral) ☐ 226
   - Modem ☐ 227
   - Monitor ☐ 228
   - Printer ☐ 229
   - Other (please specify) _____ 230
6. Which of the following peripherals do you plan to purchase in the next 12 months? (check all that apply)
   - Disk Drive ☐ 231
   - Joystick (or game peripheral) ☐ 232
   - Modem ☐ 233
   - Monitor ☐ 234
   - Printer ☐ 235
   - Other (please specify) _____ 236
7. Approximately how much do you plan to spend on your computer or computer-related items in the next 12 months?
   - Under $100 ☐ 237
   - 100–499 ☐ 238
   - 500–999 ☐ 239
   - 1000–1999 ☐ 240
   - 2000 or over ☐ 241
   - Don't know ☐ 242
8. Please put an X in the box which indicates your age group.
   - Under 18 ☐ 243
   - 18–29 ☐ 244
   - 30–44 ☐ 245
   - 45–65 ☐ 246
   - Over 65 ☐ 247
9. What is the highest level you completed in school?
   - Some high school or less ☐ 248
   - High school graduate ☐ 249
   - Attended college 1–3 years ☐ 250
   - College graduate ☐ 251
   - Post-graduate study without degree ☐ 252
   - Master's degree ☐ 253
   - Doctoral degree ☐ 254
10. Would you describe your present occupation as
    - Student ☐ 255
    - Manufacturing/service ☐ 256
    - Clerical/technical ☐ 257
    - Sales ☐ 258
    - Educator ☐ 259
    - Professional ☐ 260
    - Other ☐ 261
11. What is the total combined annual income before taxes for all members of your household?
    - Less than $10,000 ☐ 262
    - 10,000 to 14,999 ☐ 263
    - 15,000 to 19,999 ☐ 264
    - 20,000 to 24,999 ☐ 265
    - 25,000 to 34,999 ☐ 266
    - 35,000 to 49,999 ☐ 267
    - 50,000 to 74,999 ☐ 268
    - 75,000 or over ☐ 269
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3278: 18 85 1B 20 1E 1B
3280: 20 1E 1B A0 00 91
3288: 1E 1B A0 01 91 1B
3290: 1A A5 6B 85 1B A5
3298: 1C A0 00 20 1E 1B
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3D58: C3 C1 CC C3 A0 C6 C9 CC 7B
3D60: C5 00 20 FF B4 60 B0 39 83
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Apple Automatic Proofreader

Tim Victor

It's easier than ever to enjoy programs for Apple II–series computers. "Apple Automatic Proofreader," an error-checking program for the Apple II, II+, IIe, and IIc with either DOS 3.3 or ProDOS, alerts you to almost every typing mistake you might make.

"Apple Automatic Proofreader" will help you type in program listings without typing mistakes. It's a short error-checking program that hides itself in memory and attaches to your Apple's operating system. Each time you press Return to enter a program line, this routine displays a two-digit checksum at the top of your screen. If you've typed the line correctly, the checksum on your screen matches the one in the printed listing—it's that simple. You don't have to use the Proofreader to enter listings, but doing so greatly reduces your chance of making a typo.

Getting Started

First, type in the Apple Automatic Proofreader program following this article. The Proofreader can't check itself before it's finished, so you'll have to be extra careful to avoid mistakes.

The Proofreader checks which operating system you're running before it hooks up the checksum routine, so you can type it in with either DOS 3.3 or ProDOS. If you want to use the Proofreader with both operating systems, you won't have to retype it. All you need is a utility to copy a file between disks with different formats, such as the one provided on the ProDOS *User's* or *System Utilities* disk.

As soon as you finish typing the Proofreader, save at least two copies. This is very important, because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Now, type RUN and hit Return. The Proofreader clears the screen, loads the machine language routine, displays the message PROOFREADER ACTIVATED, erases the BASIC portion of itself, and ends. If you type LIST and press Return, you'll see that no BASIC program is in memory. The computer is ready for you to type in a new BASIC program.

Entering Programs

Once the Proofreader is activated, you can begin typing in a BASIC program as usual. Every time you finish typing a line and press Return, the Proofreader displays a two-digit checksum number in the upper-left corner of the screen. Compare this checksum with the two-digit checksum printed next to the corresponding line in the program listing. If the numbers match, you can be pretty certain the line was typed correctly. Otherwise, check for your mistake and type the line again.

A common mistake in entering BASIC programs on the Apple occurs when you accidentally press a key while holding down the Control key. This adds an invisible control character to the line you are typing. If you don't find it before you run the program, this stray character may cause a SYNTAX ERROR or other mysterious behavior. Fortunately, the Proofreader detects the presence of these invisible control characters and displays a checksum that doesn't match the one in the listing. So it's always a good idea to retype a line if the checksums don't match, even though you might not see any difference in the lines themselves.

The Proofreader ignores space characters, so you can omit spaces between keywords and still see a matching checksum. Spaces are important only between the quotation marks of PRINT statements or string assignments. The only mistake the Proofreader won't catch is if you accidentally type too many spaces or leave some out. For this reason, be extra careful when you're entering text within quotes.

Before you run another BASIC program, it's a good idea to turn off the Proofreader by holding down the Control key while pressing the Reset button. The machine language part of the Proofreader is kept in memory starting at address 768 ($300 hexadecimal). This location is out of BASIC's way, but a lot of other programs use this same place for their machine language subroutines. Disable the Proofreader to avoid conflicts.

How It Works

When the Applesoft BASIC interpreter needs to get a line of input from the keyboard, it calls a machine language routine in the Apple's read-only memory (ROM) called GETLN. GETLN, in turn, calls the operating system to get a single keypress, which it stores in an input buffer. If the Return key is pressed, GETLN ends, leaving one new line for the BASIC interpreter in the input buffer. Otherwise, it repeats the process, asking for another keypress.

The operating system normally gets individual keystrokes from a ROM routine called KEYIN, but the Proofreader changes this. When the Proofreader is installed, the operating system calls the checksum routine instead, and the checksum routine asks KEYIN for a character. If any key other than Return is pressed, the checksum routine just passes it on to the operating system, which gives it to

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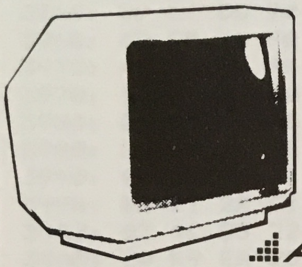

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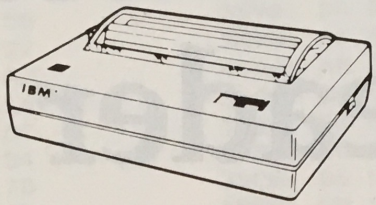

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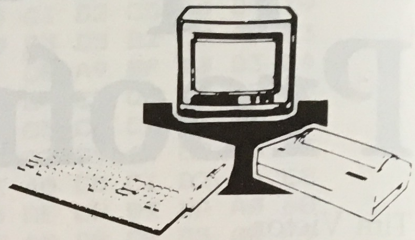

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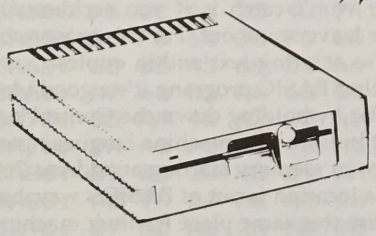

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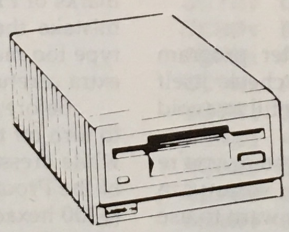

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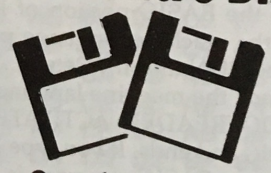

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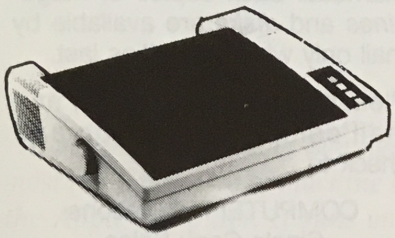

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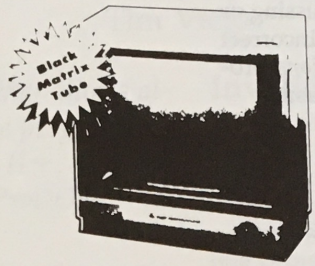

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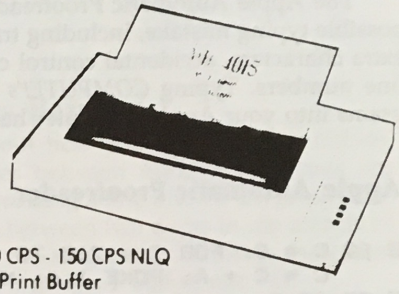

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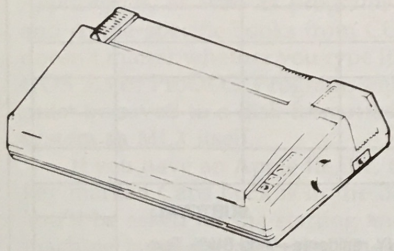

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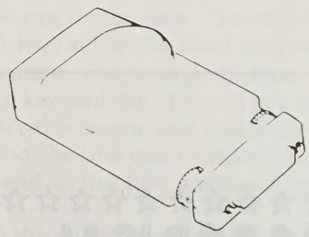

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GETLN. But if Return *is* pressed, the checksum routine examines the contents of GETLN's input buffer, which now contains an entire line of input, to calculate the checksum that it displays at the top of the screen.

A common typing mistake is transposition—typing two successive characters in the wrong order, like *PIRNT* instead of *PRINT*. A checksum program that merely adds the codes of the characters in a line can detect only the presence or absence of a character, not transposition errors. Because the Apple Proofreader uses a sophisticated formula to compute checksums, it alerts you to transposed keystrokes.

The Apple Automatic Proofreader detects almost every possible typing mistake, including transpositions, missing or extra characters, accidental control characters, and incorrect line numbers. Typing *COMPUTE!'s Apple Applications* programs into your Apple computer has never been easier.

Apple Automatic Proofreader

```
52 10 C = 0: FOR I = 768 TO 768 + 68: READ A:
     C = C + A: POKE I,A: NEXT
8C 20 IF C < > 7258 THEN PRINT "ERROR IN PROO
     FREADER DATA STATEMENTS": END
D0 30 IF PEEK (190 * 256) < > 76 THEN POKE 56
     ,0: POKE 57,3: CALL 1002: GOTO 50
70 40 PRINT CHR$ (4);"IN#A$300"
24 50 POKE 34,0: HOME : POKE 34,1: VTAB 2: PR
     INT "PROOFREADER INSTALLED"
FE 60 NEW
52 100 DATA 216,32,27,253,201,141
10 110 DATA 208,60,138,72,169,0
75 120 DATA 72,189,255,1,201,160
FA 130 DATA 240,8,104,10,125,255
47 140 DATA 1,105,0,72,202,208
1B 150 DATA 238,104,170,41,15,9
AF 160 DATA 48,201,58,144,2,233
D8 170 DATA 57,141,1,4,138,74
9E 180 DATA 74,74,74,41,15,9
B5 190 DATA 48,201,58,144,2,233
E3 200 DATA 57,141,0,4,104,170
A9 210 DATA 169,141,96
```

aa

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Apple MLX

Machine Language Entry Program

Tim Victor

"Apple MLX" is a labor-saving utility that allows almost fail-safe entry of machine language programs on the Apple computer. It runs on the II, II+, IIe, and IIc, and IIGS, with either DOS 3.3 or ProDOS.

A machine language program is usually listed as a long series of numbers. It's hard to keep your place and even harder to avoid making mistakes as you type in the listing, since an incorrect line looks almost the same as a correct one. To reduce the problems associated with typing in machine language programs, we've presented them as MLX listings which can be entered using the "Apple MLX" editor.

MLX checks your typing on a line-by-line basis. It won't let you enter inappropriate characters, and it won't let you continue if there's a mistake in a line or even if you're trying to enter a line or digit out of sequence. You don't have to know anything about machine language to use it. In other words, MLX makes machine language program entry almost foolproof.

Using MLX

Type in and save MLX to disk (you'll want to use it to enter programs in this and future issues of *COMPUTE!'s Apple Applications*, as well as programs in *COMPUTE!* magazine and Apple-specific books from COMPUTE! Publications). It doesn't matter whether you type it in on a disk formatted for DOS 3.3 or ProDOS. Programs entered with MLX, however, must be saved to a disk formatted with the same operating system as MLX itself.

If you have an Apple IIe, IIc, or IIGS, make sure that the key marked Caps Lock is in the down position. Type RUN. You'll be asked for the starting and ending addresses of the machine language program. These values are given at the beginning of the machine language program listing and in the program's accompanying article. Find them and type them in.

The next thing you'll see is a menu asking you to select a function. The first is (E)nter Data. If you're just starting to type in a program, choose this function. Press the E key, and the program asks for the address where you want to begin entering data. Type the first number in the first line of the program listing if you're just starting, or the line number where you left off if you've already typed in part of a program. Hit the Return key and begin entering the data.

Once you're in enter mode, MLX will print the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight bytes and a checksum. When you enter a line and hit Return, MLX recalculates the checksum from the eight bytes and the address. If you enter more than or fewer than nine numbers, or if the checksum doesn't exactly match, MLX erases the line you just entered and prompts you again for the same line.

Invalid Characters Banned

MLX is fairly flexible about how you type in the numbers. You can put extra spaces between numbers or leave the spaces out entirely, compressing a line into 18 keypresses. Be careful not to put a space between two digits in the middle of a number. MLX will read two single-digit numbers instead of one two-digit number (F 6 means F *and* 6, not F6).

You can't enter an inappropriate character with MLX. Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), nothing happens. This safeguards against entering extraneous characters. Even better, MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake.

MLX also checks to make sure you're typing in the right line. The address (the number to the left of the colon) is part of the checksum recalculation. If you accidentally skip a line and try to enter incorrect values, MLX won't let you continue. Just make sure you enter the correct starting address; if you don't, you won't be able to enter any of the following lines. MLX will stop you.

Editing Features

MLX also includes some editing features. The left- and right-arrow keys allow you to back up and go forward on the line you're entering so that you can retype data. Pressing the Ctrl (*Control*) key and the D (*Delete*) key at the same time removes the character under the cursor, shortening the line by one character. Pressing the Ctrl key and the I (*Insert*) key simultaneously puts a space under the cursor and shifts the rest of the line to the right, making the line one character longer. If the cursor is at the right end of the line, neither Ctrl-D nor Ctrl-I has any effect.

When you've entered the entire listing (up to the ending address that you specified earlier), MLX automatically leaves Enter mode and redisplays the functions menu. If you want to leave Enter mode before then, press the Return key when MLX prompts you with the address of a new line.

Display Data

The second menu choice, (D)isplay Data, examines memory and shows the contents in the same format as the program listing. You can use it to check your work or to see how far you've gotten. When you press the D key, MLX asks you for a starting address. Type in the address of the first line that you want to see and hit Return. MLX displays program lines until you press any key or until it reaches the end of the program.

Save and Load

Other menu selections are provided to let you save programs to disk and load them back into the computer. These are (S)ave File and (L)oad File. MLX asks you for the name of the

file which contains the program. The first time you save a machine language program, there won't be a file on the disk containing the program. Whatever name you type in will be the name of a new file that's created.

The message DISK ERROR appears during a SAVE or LOAD if a problem is detected. If you're not sure why a disk error has occurred, check the disk drive. Make sure there's a formatted disk in the drive and that it was formatted by the same operating system that you're using for MLX (ProDOS or DOS 3.3). If you're trying to save a file and see an error message, the disk might be full. Either save the file on another disk or quit MLX (by pressing Q), delete an old file or two, and then run MLX again. Your typing should still be safe in memory. If the error message appears during a load, you may have specified a filename that doesn't exist on the disk.

Quit

The (Q)uit menu option has the obvious effect—it stops MLX and enters BASIC. (Of course, you can also press Ctrl-Reset to get out of MLX.)

The Finished Product

When you've finished typing all the data for a machine language program and have saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. You'll almost always load and run an MLX-generated program by typing BRUN *filename* (or sometimes just BLOAD).

An Ounce Of Prevention

By the time you finish typing in the data for a long program, you may have several hours invested in the project. Don't take chances—use the "Apple Automatic Proofreader" to enter MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses; then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to insure that you can recall your work from disk. Don't let a simple typing error in MLX cost you several nights of hard work.

Line 100 of MLX traps all errors to line 610. If MLX is typed in correctly, only disk errors should be encountered. A disk-error message when you're not trying to access the drive—for example, when you first start entering data—indicates a typing error in the MLX program itself. If this occurs, hit Ctrl-Reset to break out of MLX and carefully compare your entry against the printed listing.

Apple MLX: Version 1.1

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```
35 100 N = 9: HOME : NORMAL : PRINT CHR$ (17);"
       APPLE MLX V1.1": POKE 34,2: ONERR GOTO 6
       10
CC 110 VTAB 1: HTAB 20: PRINT "START ADDRESS";:
        GOSUB 530: IF A = 0 THEN PRINT CHR$ (7)
       : GOTO 110
8C 120 S = A
EJ 130 VTAB 2: HTAB 20: PRINT "END ADDRESS  ";:
        GOSUB 530: IF S > = A OR A = 0 THEN PRI
       NT CHR$ (7): GOTO 130
20 140 E = A
B5 150 PRINT : PRINT "CHOOSE:(E)NTER DATA";: HT
       AB 22: PRINT "(D)ISPLAY DATA": HTAB 8: P
       RINT "(L)OAD FILE  (S)AVE FILE  (Q)UIT":
       PRINT
AE 160 GET A$: FOR I = 1 TO 5: IF A$ < > MID$ (
       "EDLSQ",I,1) THEN NEXT : GOTO 160
93 170 ON I GOTO 270,220,180,200: POKE 34,0: EN
       D
AF 180 INPUT "FILENAME: ";A$: IF A$ < > "" THEN
        PRINT CHR$ (4);"BLOAD";A$;",A";S
A1 190 GOTO 150
6D 200 INPUT "FILENAME: ";A$: IF A$ < > "" THEN
        PRINT CHR$ (4);"BSAVE";A$;",A";S;",L";E
       - S
92 210 GOTO 150
C2 220 GOSUB 590: IF B = 0 THEN 150
9E 230 FOR B = B TO E STEP 8:L = 4:A = B: GOSUB
        580: PRINT A$;": ";:L = 2
85 240 FOR F = 0 TO 7:V(F + 1) = PEEK (B + F):
       NEXT : GOSUB 560:V(9) = C
F2 250 FOR F = 1 TO N:A = V(F): GOSUB 580: PRIN
       T A$" ";: NEXT : PRINT : IF PEEK (49152)
        < 128 THEN NEXT
94 260 POKE 49168,0: GOTO 150
CC 270 GOSUB 590: IF B = 0 THEN 150
4B 280 FOR B = B TO E STEP 8
A6 290 HTAB 1:A = B:L = 4: GOSUB 580: PRINT A$;
       ": ";: CALL 64668:A$ = "":P = 0: GOSUB 3
       30: IF L = 0 THEN 150
F9 300 GOSUB 470: IF F < > N THEN PRINT CHR$ (7
       );: GOTO 290
27 310 IF N = 9 THEN GOSUB 560: IF C < > V(9) T
       HEN PRINT CHR$ (7);: GOTO 290
72 320 FOR F = 1 TO 8: POKE B + F - 1,V(F): NEX
       T : PRINT : NEXT : GOTO 150
8E 330 IF LEN (A$) = 33 THEN A$ = O$:P = O: PRI
       NT CHR$ (7);
22 340 L = LEN (A$):O$ = A$:O = P:L$ = "": IF P
        > 0 THEN L$ = LEFT$ (A$,P)
E0 350 R$ = "": IF P < L - 1 THEN R$ = RIGHT$ (
       A$,L - P - 1)
55 360 HTAB 7: PRINT L$;: FLASH : IF P < L THEN
        PRINT MID$ (A$,P + 1,1);: NORMAL : PRIN
       T R$;
7B 370 PRINT " ";: NORMAL
E6 380 K = PEEK (49152): IF K < 128 THEN 380
C1 390 POKE 49168,0:K = K - 128
5B 400 IF K = 13 THEN HTAB 7: PRINT A$;" ";: RE
       TURN
A7 410 IF K = 32 OR K > 47 AND K < 58 OR K > 64
        AND K < 71 THEN A$ = L$ + CHR$ (K) + R$
       :P = P + 1: GOTO 330
C7 420 I = FRE (0): IF K = 4 THEN A$ = L$ + R$
5F 430 IF K = 9 THEN A$ = L$ + " " + MID$ (A$,P
       + 1,1) + R$
0A 440 IF K = 8 THEN P = P - (P > 0)
93 450 IF K = 21 THEN P = P + (P < L)
9D 460 GOTO 330
37 470 F = 1:D = 0: FOR P = 1 TO LEN (A$):C$ =
       MID$ (A$,P,1): IF F > N AND C$ < > " " T
       HEN RETURN
BB 480 IF C$ < > " " THEN GOSUB 520:V(F) = J +
       16 * (D = 1) * V(F):D = D + 1
5F 490 IF D > 0 AND C$ = " " OR D = 2 THEN D =
       0:F = F + 1
08 500 NEXT : IF D = 0 THEN F = F - 1
17 510 RETURN
B5 520 J = ASC (C$):J = J - 48 - 7 * (J > 64):
       RETURN
AB 530 A = 0: INPUT A$:A$ = LEFT$ (A$,4): IF LE
       N (A$) = 0 THEN RETURN
6F 540 FOR P = 1 TO LEN (A$):C$ = MID$ (A$,P,1)
       : IF C$ < "0" OR C$ > "9" AND C$ < "A" O
       R C$ > "Z" THEN A = 0: RETURN
2D 550 GOSUB 520:A = A * 16 + J: NEXT : RETURN
28 560 C = INT (B / 256):C = B - 254 * C - 255
       * (C > 127):C = C - 255 * (C > 255)
20 570 FOR F = 1 TO 8:C = C * 2 - 255 * (C > 12
       7) + V(F):C = C - 255 * (C > 255): NEXT
       : RETURN
DA 580 I = FRE (0):A$ = "": FOR I = 1 TO L:T =
       INT (A / 16):A$ = MID$ ("0123456789ABCDE
       F",A - 16 * T + 1,1) + A$:A = T: NEXT :
       RETURN
1F 590 PRINT "FROM ADDRESS ";: GOSUB 530: IF S
       > A OR E < A OR A = 0 THEN B = 0: RETURN
0D 600 B = S + 8 * INT ((A - S) / 8): RETURN
B6 610 PRINT "DISK ERROR": GOTO 150
```

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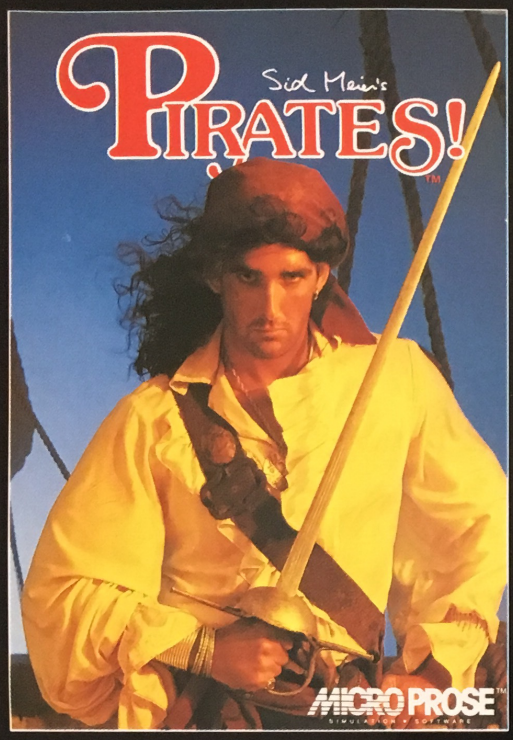

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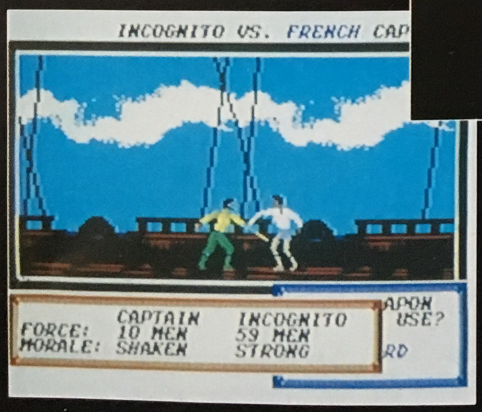

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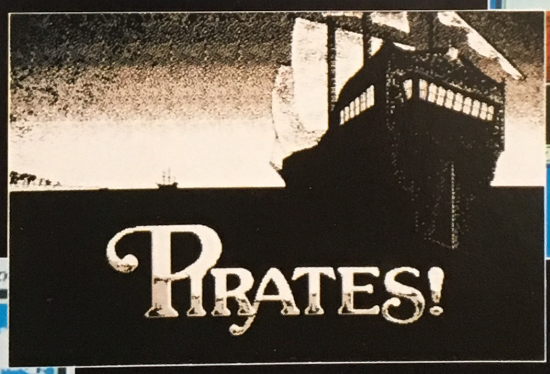

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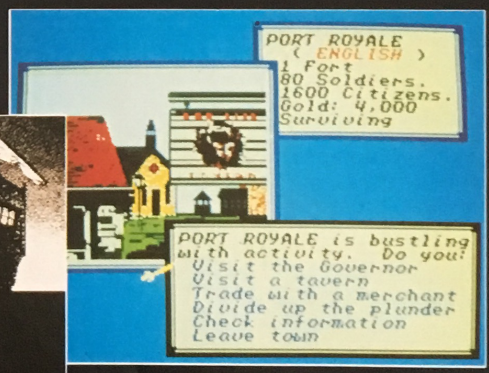

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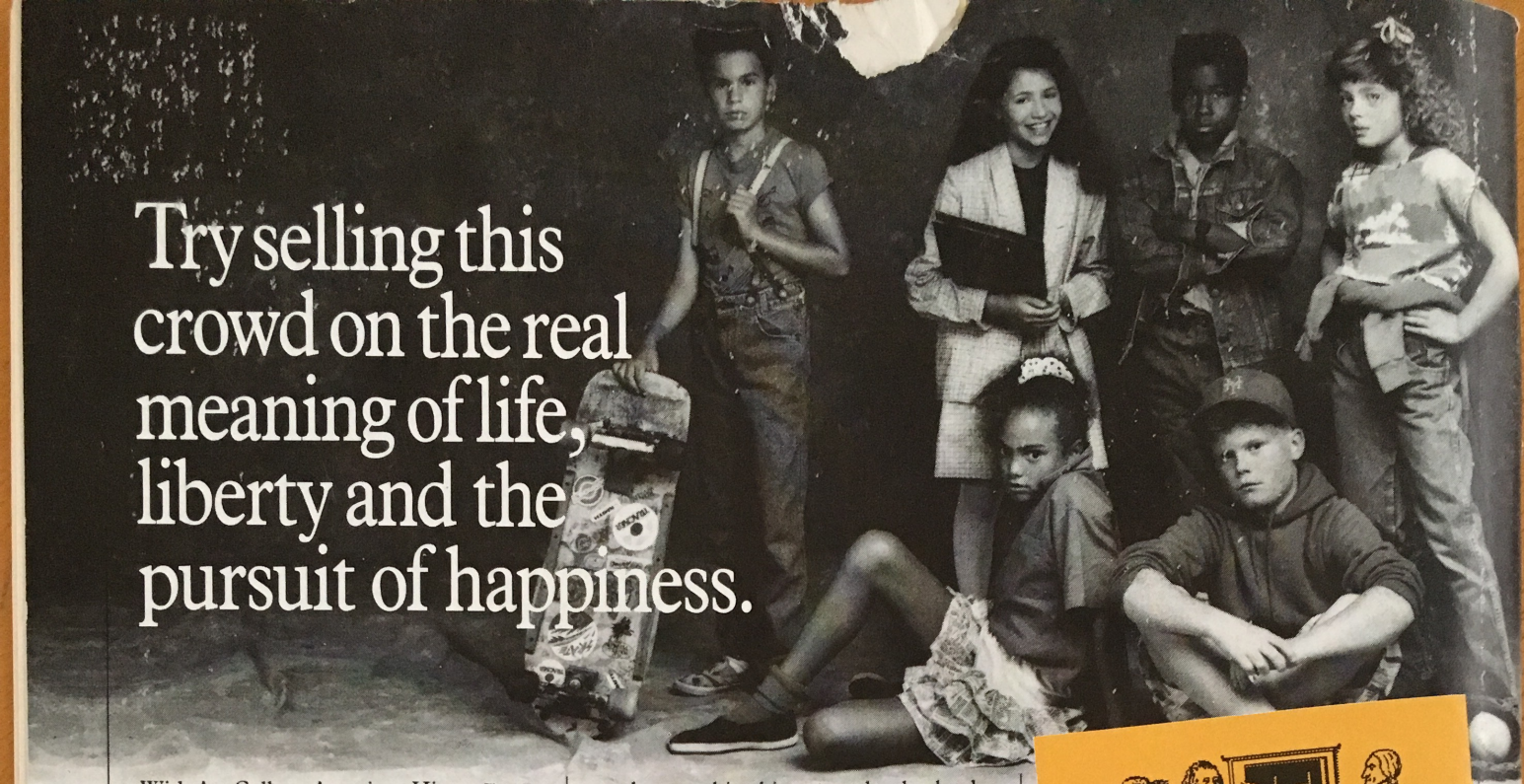

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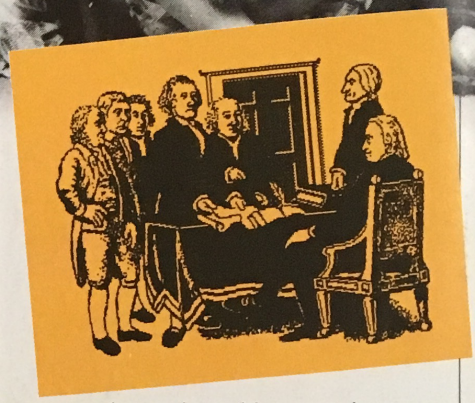

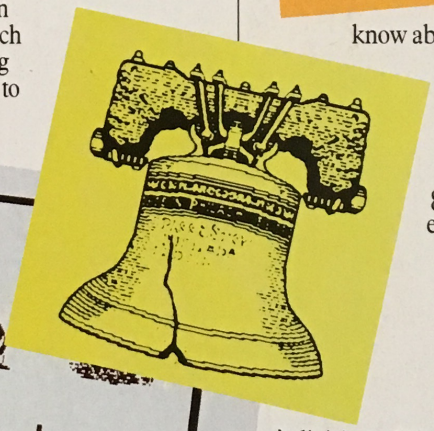

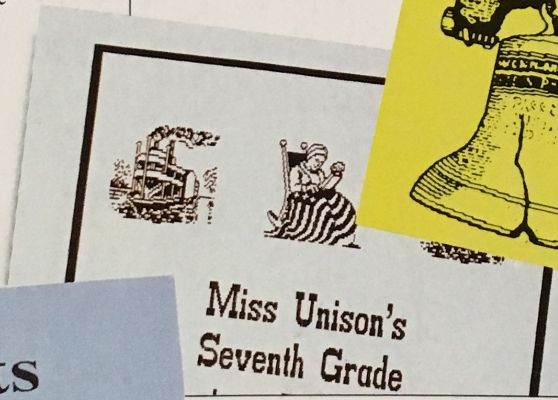

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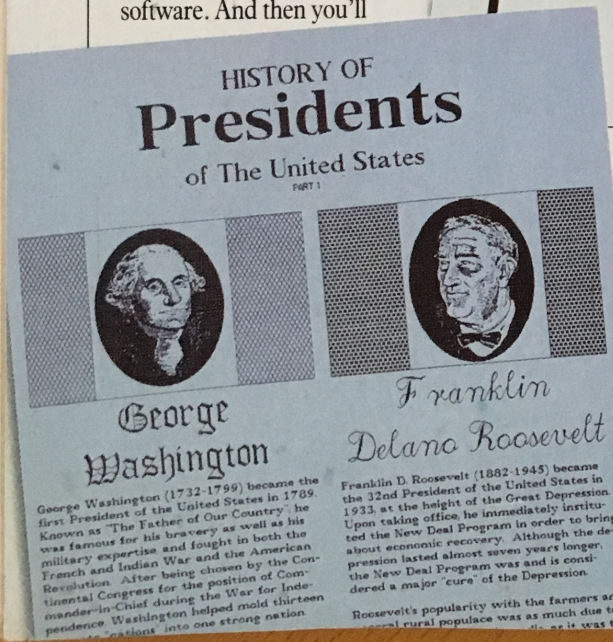

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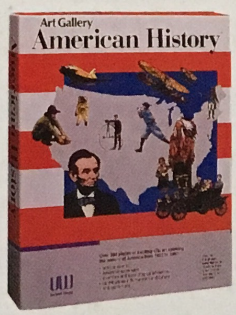

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